

TRADE AND ENVIRONMENT:  
INTERNATIONAL CONTEXT, POLICY RESPONSE, AND LAND USE  
IN BRAZIL

By

PAMELA E. STEDMAN

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By

Pamela E. Stedman

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Major Department: Political Science

Environmental degradation in developing countries has become an international issue, both as a cause of global environmental change and as an effect of international political-economic forces. In Latin America, land conversion constitutes the greatest environmental change occurring both in local and global terms. Trade, which is expanding in Latin America, is the primary mechanism through which international context is linked to national and local production and land use. Both the current debate over trade liberalization and the literature on trade and development have inadequately addressed the role that trade pressures play in shaping environmental outcomes in developing countries.

This dissertation expands the debate over trade and environment by exploring the international context and trade-related factors underlying Latin America's land-use patterns, and by using the case of Brazilian agricultural land use to illuminate the importance of trade pressures. Neo-structuralist critiques of neoclassical economics are used as a starting point for developing a more complete understanding of the relationship between trade drivers, domestic policy positions, and land-use patterns. The dissertation

critiques the current trade-environment and trade-development literature and develops a more comprehensive and relevant theoretical framework for understanding how international and domestic determinants of trade patterns shape the scope and nature of land-use change. The discussion establishes grounds for interpreting the impacts on resources of domestic policy responses to international foreign exchange and development constraints. A brief review of Latin America's history of resource use and exports is used to illustrate the preeminence of these trade drivers in shaping Latin American economies. The Brazil case study illustrates the effect of trade drivers, including various international economic conditions and policy responses, on recent agricultural land-use patterns.

While this study reveals some strong links between trade drivers and land-use change, no final answers can be provided to the trade-environment debate. The pressures to trade are not eliminated by protectionist policies; nor are their effects on natural resource use. Trade often offers better opportunities for development and sound resource use than self-sufficiency options. However, the fundamental impact of international macroeconomic forces on the scale and pattern of resource use, through trade, must be recognized.

## CHAPTER I INTRODUCTION

Environmental degradation in developing countries has become an international issue, both as a cause of global environmental change and as an effect of international political-economic forces. Environmental concerns are becoming increasingly global and international in nature as recognition and understanding grows of climate change, biodiversity loss, and the implications of resource degradation for poverty and development. Yet while nations are given increasing responsibility for environmental conservation, international economic forces are giving greater impetus to resource exploitation and environmental change.

Land conversion constitutes the greatest environmental change occurring in Latin America, in terms of both local impact and contribution to global change (Ojima et al. 1994, Houghton 1994). International trade, which is expanding in the region, plays a role in determining land-use patterns. Trade is the primary mechanism through which international influences are linked to national and local production patterns and the environment. The current trade-environment debate raises substantial questions about the direction and the magnitude of trade impacts on natural resources. However, policy-oriented efforts to reconcile trade and environmental objectives have taken a largely marginal approach and have failed to seriously consider either the scale of change related to international markets or the global ramifications of that change. Moreover, the fundamental role that trade has historically played in Latin American resource exploitation has been too often ignored by economic and environmental policy-makers. Trade has not been a neutral force as trade theory suggests, but rather has been driven by political-economic forces that have promoted resource exploitation fairly consistently. It seems

unlikely that post-War development in the region has reduced the role of international trade as a driving force in land-use and resource exploitation patterns.

To deepen our understanding of the connection between trade and environment, this research examines changes in land use related to trade patterns, both through theoretical exploration of linkages and trade drivers, and through a review of Latin American patterns of resource exports and a case study of Brazil's agricultural land use and trade over the last thirty years. In short, this study explores the critical role that international trade drivers, mediated by domestic policy filters, play as determinants of resource use, affecting the extent and intensity of production. Given the current push for trade liberalization and regional trade agreements, this empirical political-economy study aims to provide an initial step towards assessing the local and global land-use consequences of Latin American trade patterns.

### The Trade-Environment Debate

Although the environmental impact of free trade has received some attention, primarily in light of the NAFTA negotiations, the nature of the changes in land use that accompany increased trade have not been carefully explored (Runge 1993b, Lutz 1990, Sutton 1988). To date, studies of trade effects on the natural resource sectors have focused on prices, income distribution, and production levels, and have not been extended to the land-use implications of trade policy. Economic literature has generally failed to unite trade theory with natural resource economics, focusing on micro-level decisions about land use rather than larger scale changes. The decisions about modification of regional ecosystems and global conditions that are implied by accumulation of local-level changes have been largely ignored.<sup>1</sup> Yet such

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<sup>1</sup> Export of timber is one of the few trade-resource issues that has garnered international attention; efforts to govern the international timber trade, however, have been ineffective.

environmental changes, at least in terms of area affected, are likely to have the greatest and most irreversible environmental effects (Ojima et al. 1994).

Economists and development institutions promote trade liberalization as the new road to development. For the agriculture and forestry sectors, it is held that free trade will eliminate market distortions that lead to inappropriate resource use. Competitive markets will spur countries to make use of their comparative advantage, which should be in those land uses most suited to the local environment. Moreover, increases in exports will raise income levels and foster development in liberalizing countries, eventually leading to reduced dependence on natural-resource exports and greater environmental consciousness. Thus, by contributing to development, trade contributes to better treatment of the environment (e.g., Bhagwati, Anderson and Blackhurst 1992, OECD 1994).

Environmentalists, on the other hand, blame freer trade and reduced state roles for greater environmental problems. Free trade and international capital flows, in their view, are expected to lead to increased deforestation, monocropping, and more intensive use of mechanical and chemical inputs, as well as increased use of the most productive land for export crops, to the overall detriment of the environment (e.g., Nader 1993, Ritchie 1993, Daly and Goodland 1994, Whiteford and Ferguson 1991). The arguments on both sides are much more complex than this, and generally more sophisticated. However, little empirical evidence of the environmental impact of trade in the natural resources sectors has been produced by either camp.

The school of thought gaining most credence, or at least popularity, today attempts to reconcile the priorities and concerns of these two groups. Implementation of trade liberalization in conjunction with appropriate regulations and economic instruments to compensate for environmental externalities, it is asserted, will allow for economic growth and development with minimal environmental damage (e.g., Esty 1993, OECD 1994, Runge 1994, Pearce and Turner 1990, Southgate 1994).<sup>2</sup> The feasibility and

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<sup>2</sup> The environmental side agreements to the NAFTA are the prime example of application of this approach.

relevance of such policy interventions must be questioned, however, in light of the scale of growth and environmental change which may accompany changes in trade patterns, and in light of the historical structure of trade patterns in natural-resource-based products.

This Panglossian approach to policy, by stressing the role of rational economic choices in resource-use decisions, ignores the driving forces behind trade. A more structuralist approach reveals both the limited flexibility of nations in making resource-use and development decisions and the inappropriateness of traditional comparative advantage as a basis for promoting trade. Arguments based in dependency and neo-structuralist theory stress the loss of national control over resources under free trade, the vagaries of international commodity markets, and the role of historical economic relations and inequalities, all of which may promote environmental degradation (e.g., Sunkel 1980, Cardoso 1980, Knox and Agnew 1989, Redclift 1984, Ropke 1994). These views provide a fundamental qualification to the current understanding of trade and environment relations. Since the hand guiding trade is not invisible, though perhaps unpredictable, it is essential to reexamine the driving forces behind trade.

#### Trade Drivers, Domestic Policies, and Land Use

Land-use changes are driven by both domestic and international forces. International forces are manifested largely through trading opportunities, created by demand abroad and the spread of technological advances; and through trading exigencies, created by foreign exchange demand at home and the limited range of export opportunities afforded by established economic structures. These forces are filtered through various domestic policies, which may magnify or reduce their effect on land use. Governments use trade policy tools either to delink countries from the international economy or to promote inflows of goods and capital for development. The impact of international trade is substantial in many Latin American countries where, on average, export revenues account for 11% of GDP. For Brazil, the figure is over 7% (World Bank). Unilateral trade liberalization in response to the debt crisis



and international pressures, as well as trade agreements including the Mercosul agreement, the Uruguay Round of GATT, and NAFTA, are currently expanding the role of trade throughout Latin America.

Domestic forces, including population growth, urbanization, and land-ownership patterns, as well as government policies, also play a role in determining frontier expansion and changing land-use patterns through their effects on production and trade of agricultural commodities. Government interventions affecting the viability of trade in the natural-resource sectors occur in two main forms: sector-specific policies, such as subsidies, credit restrictions, and price controls; and macroeconomic and trade policies, such as exchange rate interventions and tariffs. While domestic sectoral policies are important determinants, trade and related macroeconomic policies influence trade volumes and land-use patterns perhaps to an even greater extent (Bautista and Valdés 1993, Garcia 1990, Skole et al. 1994).

Trade liberalization, especially if accompanied by a reduction in sectoral interventions in markets, decreases government influence over domestic and international demands on natural resources. Trade can and does change land use, as Latin America's long history of resource exploitation clearly illustrates. But, despite the fact that most models of agricultural liberalization predict substantial production increases in the developing world (Goldin and Knudsen 1990, Anderson and Blackhurst 1992, Lutz), the trade-land relationship has been largely ignored by the literature on trade and the environment. Debate and policy recommendations have focused on questions of competitiveness, labor and employment, and industrial pollution, rather than on land-use intensification and expanding human occupation of relatively undisturbed ecosystems, or on the government's role in directing land-use change (e.g., Runge, Esty, OECD 1994).

#### The Scale and Environmental Impacts of Land-Use Change

The local and global environmental impacts of changes induced by trade structures are critical in terms of the extent of land affected and the irreversibility of some environmental change. Land use

"involves both the manner in which the biophysical attributes of the land are manipulated and the intent underlying that manipulation--the purpose for which land is used"(Turner et al. 1995, p.15).<sup>3</sup> Three broad types of land-use change can be identified: change from "natural" land cover to human occupation; change in the form and intensity of human use; and cumulative change affecting regional and global environmental conditions. The first involves the extent to which agriculture and related productive uses incorporate new land into cultivation and human management. The second identifies the extent to which crop production is intensified through faster rates of extraction, changes in crops, greater capital and labor inputs, or more efficient techniques. Both these changes may be of local environmental importance, depending on the crops and techniques involved. There has been much discussion, for example, of the environmental degradation caused by frontier expansion for cattle ranching and by increased use of fertilizers in many agricultural exporting countries (e.g., Hecht 1993, Whiteford and Ferguson 1991). Not all such changes need be environmentally detrimental. For example, changes in policy or markets may promote allocation of land to more suitable crops; opening of new productive land may ease pressure on marginal or degraded lands.

The third type is the cumulative change that contributes to loss of biodiversity and ecosystems and to alteration of global climatic and atmospheric conditions. Rapid land conversion over the last century, which has doubled the area in crops and pasture, is creating significant cumulative effects. Land conversion causes quantitative and qualitative changes in ecosystems, including changes in community composition and development, and in carbon, water, and energy fluxes (Ojima et al. 1994) at the local and global levels.

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<sup>3</sup> Land cover is defined as the "biophysical state of the earth's surface and immediate subsurface, including biota, soil, topography, surface and ground water, and human structures."(Turner et al. 1995, p.15) All of these characteristics may be profoundly altered by land use, regardless of whether a particular land use takes advantage of, or deliberately modifies, natural features of land cover.

The pace of change has accelerated. About one-third of the global land surface is now in crops or pasture.<sup>4</sup> One-half of this cultivated area has been added over the last century. Land-use change accelerated with the industrial revolution<sup>5</sup>, affecting the industrializing countries first. In recent decades, land-use change and deforestation in tropical countries have proceeded at a pace unprecedented in the North (Houghton et al. 1991). Cropland in the tropics has doubled over the last fifty years (Houghton 1994). Since 1850, 28% of Latin America's forest has been lost, 44% to pastures, 25% to croplands, 10% to shifting cultivation, and 20% to degraded lands (Houghton et al. 1991). The most dramatic change has occurred since 1960.

About 63% of the earth's land surface is either already used for agriculture or is unsuitable for agricultural use; lands not yet exploited for agriculture are likely to be less productive than lands already appropriated for agriculture (Houghton 1994). Increasingly, agricultural production is raised through intensification rather than land expansion, as more technical "fixes" become available, and as land suitable for agriculture becomes scarcer (Ruttan 1994).

Conversion of land for agricultural use has been the main source of land-use change throughout history (Tucker and Richards 1993).<sup>6</sup> Recent data from tropical regions suggest, however, that only half of forest loss worldwide is accounted for by agricultural expansion. In Latin America, the rate is probably higher; the FAO reports that two-thirds of forest loss in Latin America was accounted for by cropland expansion<sup>7</sup> in the first half of the 1980s. Nevertheless, in the Brazilian Amazon, the world's

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<sup>4</sup> About 30% of this area is in permanent and annual crops, and 70% in pasture (FAO).

<sup>5</sup> Richards (1990) reports that between 1700 and the mid-1980s cropland expanded by between 392% and 466%.

<sup>6</sup> Other important changes in land cover have resulted from logging and from urbanization.

<sup>7</sup> The comparable figures for Africa and Asia are much lower at 10% and 41% (Houghton 1994), in part reflecting the higher relative value of logging operations.

largest remaining expanse of tropical forest (Skole et al. 1994), studies suggests that agricultural land is abandoned after about five years of cultivation (Uhl et al. 1988).

The environmental costs of deforestation and conversion of grass and shrublands to croplands and pasture have been reviewed many times but bear brief enumeration here. Local and regional environmental losses attributable to land conversion can include losses of watershed protection, local species, timber and non-timber production, and soil and soil nutrients, contributing to disruption of nutrient cycles, river and dam siltation, increased frequency and severity of floods, and local climate change (Houghton 1994). One model (Shukla et al. 1990) has found that local climate change in the Amazon resulting from deforestation, including changes in rainfall patterns, may preclude forest regrowth in areas of extensive deforestation. Crop and cattle production exacerbates many of the initial effects of deforestation and further contributes to environmental degradation with salinization and acidification of soils, nitrification of groundwater, and pesticide and chemical contamination. Some losses are irreversible, most notably species extinction but also local productivity and ecosystems. Many land-use change decisions made with short-term goals in view may prove to be irrevocable.

Damages are increasingly apparent but difficult to measure.<sup>8</sup> Estimates of forest losses vary widely; very few tropical countries have reliable estimates of forest resources and conversion is occurring rapidly. However, annual loss of forest cover in recent years may be as much as 100,000 to 200,000 km<sup>2</sup> (Williams 1994). Estimates of deforestation in Latin America in the 1980s report annual rates of over 4% (Houghton 1994). The rate of deforestation in the Brazilian Amazon appears to be one of the highest in the world, with annual forest loss between 1.5 million ha and 2.0 million ha in recent years (Skole et al. 1994).<sup>9</sup> Estimates of cumulative change suggest that 38% of Latin America's cropland is

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<sup>8</sup> Blaikie and Brookfield (1987), for example, discuss the difficulty of measuring soil erosion.

<sup>9</sup> Skole et al. (1994) provide a thorough discussion of the various estimates of the Amazon deforestation rate offered in recent years. Lanly et al. (1991) discuss recent FAO global estimates of deforestation.

converted forest or woodland<sup>10</sup>; the rest is converted grass and shrublands (Houghton 1994). Deforestation is the most widely discussed of environmentally problematic land-use changes, but other changes are having a more immediate impact on livelihoods. Desertification may be affecting almost 300 million ha of arid land in Mexico and South America (WRI 1989). Rates of soil erosion in some parts of El Salvador and the Dominican Republic, two severely affected countries, range between 190 and 346 tons/ha/year (UN ECLAC 1991).

At the global level, recent evidence is quite conclusive that human-induced climate change is already occurring (e.g. Kerr 1995). While fossil fuels bear much of the blame for the enhanced greenhouse effect, about 25% of the human-induced greenhouse effect is attributed to land-use change (Houghton 1994). The replacement of forests with croplands causes increases in global atmospheric concentrations of CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, and other trace gases contributing to global warming. Worldwide, CO<sub>2</sub> emissions from deforestation are estimated to be between one-tenth and one-half of emissions from burning of fossil fuels (Houghton et al. 1991a).<sup>11</sup> The Latin American contribution has been estimated at  $30 \times 10^{15}$  g of carbon between 1850 and 1985, with 42% due to conversion to pastures, 34% from conversion to croplands, 19% from land degradation, and 5% from shifting cultivation (Houghton et al. 1991b); about half of this conversion has occurred since 1960. Amazon deforestation is probably contributing the lion's share of CO<sub>2</sub> emissions from land conversion (Moran et al. 1994), given the extensive area affected.

The other global effect causing international concern is species extinction and loss of biodiversity. Species loss entails not only a loss of genetic diversity which could facilitate the adaptation

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<sup>10</sup> The comparable figures for Africa and Asia are 38% and 67% (Houghton 1994).

<sup>11</sup> With deforestation CO<sub>2</sub> is released both from the vegetation and from the soil. Houghton (1994) estimates that with land-cover conversion from forest to cropland, 90% of the CO<sub>2</sub> stored in vegetation is lost and 25% of the CO<sub>2</sub> stored in soil is lost, to a depth of one meter. Less CO<sub>2</sub> is lost in soils converted to pasture because the soil is not cultivated.

of the managed and unmanaged environment to global and local changes. Species loss also alters ecosystem structures and ecological processes. Land conversion can alter animal and plant communities over a much wider area than that immediately affected, through habitat fragmentation, removal and introduction of species, invasions by exotics, and alteration of nutrient and water pathways (Ojima et al. 1994). Certainly ecosystem properties often change much more quickly under human management. Local ecological changes and species loss may have environmental consequences even more important to human habitability than climate change (Turner et al. 1995) through impacts on adaptability and carrying capacity or productivity of ecosystems. Given these wide-reaching impacts of land-use change, determinants of land use merit critical attention.

### Structure of the Study

The next two chapters provide a context for interpreting and understanding the links between trade, trade drivers, and land-use patterns. Chapter 2 reviews the arguments and evidence in the debate over the impact of trade on the environment, with particular attention to the literature on trade impacts on agriculture and agricultural use of natural resources. This is the academic context in which much of the current, largely Northern, debate over Latin American trade liberalization is taking place. The discussion points to several critical issues which have been ignored by the debate: While the environmental effects of trade have been widely discussed in terms of externalities and resource pricing, the centrality of resource use to production for export in many countries, the scale on which trade affects environmental resources, and the inappropriateness of much of the existing theoretical work to land-use questions remain unaddressed.

Chapter 3 begins to build a more appropriate theoretical framework based on concepts from development and structuralist economics and from some new approaches to trade theory. The weak relationship between comparative advantage and natural resource endowments, and the influence of

unmet demand for foreign exchange and development needs, as well as international demand are considered as drivers of natural resource exports. The determinant role of international economic structures, largely absent from the trade-environment debate, is explored. The following chapters provide some empirical evidence of the role of these international trade determinants.

The historical overview of Latin American resource exploitation and the case study of Brazilian agricultural land use illustrate the critical relationship between trade drivers, trade, and land-use patterns. Chapter 4 provides a brief history of the role of trade in natural-resource use in Latin American economies and development efforts. Today's emphasis on export promotion, particularly export promotion for natural-resource-based products, must be seen as part of the historical pattern of Latin American resource exploitation in which trade and trade drivers have played a determinant role. The frequent presentation of economic liberalization and export promotion as a significant departure from traditional interventionist policies, a departure intended to change development patterns, ignores Latin America's long experience with resource-based trade. This experience can be expected to provide a more useful basis for understanding current trends in environmental exploitation and international economic relations than much of the trade and environment literature.

The case study, presented in chapters 5, 6, and 7, traces the recent history of trade and land-use relations in Brazil. The effect of trade forces and policy responses on land use is traced using both qualitative materials and quantitative data on agricultural land use, production, and trade, from the 1960s to the present. Brazil provides a useful case for this study, given the sheer size and variety of land-use changes which have occurred in recent years, the volume of exports in the economy, the availability of extensive undeveloped lands, and the importance of the Brazilian tropical forest in global terms, which make it environmentally critical. Brazil also provides a useful test case for Latin America, given its relative success in industrialization and its relative weight in the international economy. Given the size of its domestic markets, Brazil perhaps has had a better opportunity to escape from economic

dependence on primary commodities and resource exploitation than many of the smaller Latin American countries. Yet despite Brazil's differences, the country shares with the rest of Latin America a long history of dependence on natural-resource-based exports and a more recent history of import-substitution and industrial promotion followed by a return to emphasis on agricultural exports.

Brazil has traditionally had a large export sector based on its natural-resource endowment. Agricultural and renewable resource exports account for 31% of Brazilian export revenue (FAO). The range of Brazilian products includes both tropical exports and temperate crops that compete with developed country exports. Over the last thirty years, export crops have been diversified and production levels of several traded crops have changed substantially (World Bank 1982, Brandão and Carvalho 1991b).

Cropland and pasture have expanded by over 60% since 1961 (FAO), and agricultural production has increased by over 31% since the early 1980s alone (FAO). Non-traditional exports, soybeans and citrus, and import-substitutes, wheat and sugar, have expanded in recent years, while traditional exports, particularly cotton and coffee, have declined. Expansion of pasture<sup>12</sup> at the frontier has sparked considerable debate about the role of government policies and trade in promoting deforestation. The bulk of current deforestation is occurring in the Legal Amazon<sup>13</sup>, but changes in crop production and pasture are affecting all regions of the country. While population pressures play a role, much of this land-use change is attributable to economic and institutional factors (Skole et al. 1994). Concern about the environmental impact of trade liberalization is growing in the region (Andersen 1994, Velloso 1991).

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<sup>12</sup> The cattle population in Brazil has grown by 24% over the last decade (WRI 1994).

<sup>13</sup> The Legal Amazon includes Acre, Amapá, Amazonas, Pará, Rondônia, Roraima, and parts of Mato Grosso do Sul, Maranhão and Tocantins. Although the distribution is debated, the region covers 5 million km<sup>2</sup>, of which 4,090,000 km<sup>2</sup> is naturally forestland; 850,000 km<sup>2</sup> *cerrado* or savannah; and 90,000 km<sup>2</sup> water (Skole and Tucker 1993).



Brazilian government intervention in the natural-resource sectors, through both sectoral and trade policy, has been extensive. The high degree of government involvement in markets and trade make the Brazilian case comparable with much of Latin America. As in other Latin American countries, import substitution policies promoted industry at the expense of agriculture and natural resource sectors, while agricultural subsidies were implemented to reduce the impact of trade restrictions and price controls on farm incomes (World Bank 1982, Brandão and Carvalho 1991b). Resources extracted from the agricultural sector have supported both domestic development objectives and import and international debt requirements. The agricultural frontier has historically played a role in meeting trade, domestic food, and social policy goals, through increased production in newly deforested areas and absorption of displaced populations from increasingly mechanized agricultural areas (Skole et al. 1994, Ozorio de Almeida 1992). A period of economic liberalization begun by the military government after 1964 was cut short by the oil crises of the 1970s (Brandão and Carvalho 1991b). Both the oil crises and later the debt crisis contributed to substantial increases in demand for foreign exchange and thus for exportables. Recently new steps towards liberalization have been taken in the context of structural adjustment and regional trade agreements, and expanding international trade. Evidence from other Latin American countries suggests that liberalization will entail an expansion of agricultural exports (Bautista and Valdés).

This study necessarily crosses disciplinary boundaries, making use of political science, economic, and environmental literature. The central role of international politics in shaping trade patterns and the need for national and international political control over resource use and conservation in order to direct and filter the economic forces that affect the environment, however, make a study of trade-environment linkages from a political-economy perspective relevant. This exploration of the linkages between trade and land-use changes, which have received dangerously little attention, should

provide a better understanding of the environmental relevance of trade and trade policies in the natural resources sectors, which can be extended from this case study to other developing countries.

## CHAPTER 2

### THE TRADE-ENVIRONMENT DEBATE

The rise of environmentalism over the past twenty-five years has brought concerns about natural resource use, environmental degradation, and pollution to the forefront of many political and academic debates. The complex relationship among international trade, trade policy, economic development, and environmental quality, in particular, has generated numerous arguments both supporting and refuting the importance of their interactions.<sup>1</sup> Most discussions have focused on the industrial side of the equation, rather than the natural resource effects of international trade, and on the impact of environmental regulation, or lack thereof, on trade possibilities and patterns. Largely ignored has been the increased exploitation of natural resources, including agricultural resources, that may be fostered by trade pressures. The available literature on all aspects of the trade-environment relationship is generally theoretical and extrapolates widely from the little empirical work that has been done. While questions of natural resource use, including land use, are barely addressed, some inferences can be drawn from theoretical and empirical work on industry which will form a framework for placing land use within the trade-environment debate. This chapter will review the state of the debate.

Economists and policy-makers have discussed environmental problems largely in terms of externalities or market failures, to be addressed by policy. Environmental problems are not recognized as an integral part of the market-based model of development; the structural and scale changes induced by trade are largely ignored. Both intra-temporal externalities, such as pollution, and inter-temporal

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<sup>1</sup> Several good surveys of the literature on trade and environment are available including, Dean (1992), Segerson (1988), and Esty (1994). I attempt here to point out the main arguments relevant to questions on trade and land use, rather than reviewing all of the literature in the debate, much of which is highly repetitive and polemic.

externalities, such as degradation of forests beyond their capacity for regeneration, are believed to occur when private costs of economic activity are less than the social costs of that activity. Markets and prices fail "to include information about ecosystem functions, option, existence and bequest functions" (Young 1994, p.44), and thus encourage economically inefficient use. The solution from economists is, first, the elimination of market distorting policies, such as subsidies to resource use; and second, the "polluter-pays principle"<sup>2</sup>--imposition of taxes or other economic mechanisms to insure that all costs are internalized by the actor responsible for, or receiving the benefits from, environmentally damaging activity. Environmentalists, however, who see increased use and abuse of natural resources as an integral part of economic growth are unwilling to accept this "band-aid" approach to environmental problems.

The recent literature on trade and environment can be easily divided into three camps: free-trade promoters, generally neo-liberal economists; anti-trade proponents, generally environmentalists; and a large group, primarily policy advisors, who attempt to reconcile the benefits of trade and environmental protection without sacrificing either growth or sustainability objectives.

### Tracing the Development of the Debate

Most of the issues which have been discussed over the past twenty-five years, and are still discussed today, were raised early on in the trade-environment debate, in the context of industrial country concern over imposition of environmental standards on industry (d'Arge and Kneese 1972, Pearson, Siebert). Essentially the two central questions are, what impact do environmental controls have on trade and the national economy? and, what impact does trade have on environmental quality? Responses have been framed largely in terms of industrial pollution. The first question has generated arguments that restrictive environmental policies will raise production costs, weaken a country's terms of trade, and drive industries abroad. This view is countered by the argument that environmental policies have little

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<sup>2</sup> The polluter-pays-principle has been official OECD policy since 1972 (OECD 1994).

significant impact on production costs and, rather than weakening a country's trade balance, will give countries with progressive environmental policies an edge in new, cleaner technologies (e.g. Pearson 1993).

For developing countries, however, which are apt to have less restrictive environmental policies or less enforcement, the argument has run that these countries will be the recipients of the dirty, polluting industries driven out of industrialized countries by costly environmental policies. Economic theory not only posited but justified the move of pollution-intensive industries to developing countries on the basis of comparative advantage (Copeland and Taylor 1994, Leonard 1988). First, developing countries were believed to have a more abundant factor of production in their environment because lower population densities, at least in Latin American countries, and lower levels of industrial development meant that they had higher absorptive capacities for pollutants. By this logic, a country with relatively abundant pollution-absorptive capacity can be expected to have a comparative advantage in polluting industries. Likewise, a country with abundant arable land will have a comparative advantage in agricultural production.

Second, developing countries could be expected to attract pollution-intensive industries because there is lower demand in these countries for environmental quality (Low and Safadi 1992). Environmental quality has been presented as a "normal good" for which demand increases as income increases. Ingo Walter argues that:

Generally the developing countries appear to have less rigorous environmental policies than the developed countries. This is to be expected if environmental quality is in part viewed as a consumption good that is sensitive to income, so that poorer countries are able to afford lower environmental quality levels whenever this involves sacrificing other social or economic objectives. (1982, p.25)

Low-income countries, therefore, demand less environmental quality than developed countries and can be expected to value the benefits of employment and higher income brought by polluting industries, and perhaps by deforestation, more than the foregone environmental quality. The logical extension of this

argument is that, as incomes rise in developing countries, demand for environmental quality will also rise, and stricter environmental standards will be adopted and enforced. This begins to address the second question, how does trade affect the environment?

The belief that development, defined as economic growth, is the first and necessary step toward reducing environmental degradation in developing countries underlies most of the attempts to reconcile free trade arguments with environmentalist concerns. It is supported by both empirical and theoretical work that shows, first, that developing countries that have maintained closed economies have fostered their own, home-grown, polluting industries while export of polluting industries to open-economy developing countries has not been extensive (Leonard 1988). And second, rising incomes are associated with declines in pollution intensity of industries.

Closed economies promoting growth of national industries are most likely to develop polluting industries because protectionism, and associated state-led industrialization, often focuses on relatively capital- and pollution-intensive sectors such as chemicals and steel (Lucas et al. 1992, Bernstam 1991). The former USSR and Eastern European countries represent the extreme case of state-led growth in heavy industries, and are now suffering the environmental consequences. The argument that developing countries should maintain closed economies in order to avoid following the 'dirty' path to industrialization that the developed world has followed can be refuted on several grounds. This is not to say that there is a pollution-free route to development--industrialization will never be a clean process--but only that a closed economy will not necessarily experience a cleaner industrialization process than an open economy. Rather the opposite may be true. The alternative path to development that was attempted by Latin American countries with varying degrees of success (i.e. import-substitution policies) has not produced a good environmental record.

A study looking at the impact of trade policy orientation in developing countries on the toxic intensity of industry (Hettige et al. 1992) found that developing countries with open economies and high

growth in the 1970s, and even more so in the 1980s, had slow-growing or even declining pollution intensity in manufacturing, while the slow-growing economies closed to international trade showed a more rapid increase in pollution intensity. The authors attribute this difference to the workings of comparative advantage. The open economies attracted labor-intensive assembly activities, which incidentally have low pollution intensity; the protected economies concentrated growth in capital-intensive, polluting industries. Free trade policies therefore appeared environmentally beneficial.

### The Current Debate

Recently the trade-environment debate has moved away from concern with environmental regulation and has focused on this more fundamental issue of the relevance of trade policy to environment. The arguments for free trade are based on Ricardo's theory of comparative advantage, which holds that each country should specialize in producing the product in which it has a relative advantage, i.e. which it can produce relatively more cheaply. Through trade between nations, welfare--defined essentially as consumption--can be maximized. The Heckscher-Ohlin theory of international trade explains comparative advantage in terms of the abundance of factors of production. A country will have a comparative advantage in producing those products which are relatively intensive in its abundant factor of production. The original model considers only capital and labor, but the trade-environment debate has added environmental and natural resources, and pollution tolerance, to the list of factors of production (Sutton 1988). The argument against free trade is most frequently made by environmentalists who are willing to sacrifice some development and industrialization for environmental quality. Developing countries, however, cannot be expected to accept this trade-off; the prospects for development without some form of industrialization are bleak, as are the prospects for industrial development without trade.

### Trade or Environment?

The two poles of the current trade-environment debate have been best articulated and supported by Bhagwati and Daly in their public debate. Bhagwati, an ardent supporter of free trade and the GATT, works from a paradigm of neo-classical economics in which growth (of GDP) and development are practically synonymous, and trade and trade liberalization increase welfare unless proven otherwise. Much of the blame for poor resource use is placed squarely on public policies, including trade restrictions, subsidies, and other market distortions (Binswanger 1989, Mahar 1989, Repetto and Gillis 1988). Resolution of problems perceived with natural resource use will inevitably occur as incomes rise. A virtuous circle of increasing efficiency, rising incomes, slowing population growth, and concern about environmental quality is pictured.

The arguments for trade are convincing. Minimization of costs through specialization according to comparative advantage allows for a higher total level of production which means larger shares all round. Since every country will have a comparative advantage in some area, every country contributes to the expanding production and every country enjoys the benefits of trade. By allocating production more efficiently and creating larger markets, trade promotes economic growth. Trade allows access not only to markets but also to technology and investment which further contribute to growth. Linkages are easily drawn between trade and development, especially as long as growth and development are considered largely equivalent.

The work of Grossman and Krueger (1992) constitutes the strongest empirical proof to date that there is a link between rising incomes and improvements in environmental quality. Looking at over forty cities world-wide over the last fourteen years this study found that air pollution conditions follow an inverse U-shape: Pollution intensity was worst in countries with income levels per capita of US \$4,000 to \$5,000. Poorer and richer countries had better air pollution conditions, the former presumably because they have less industry and the latter because of better controls or a different industry mix. In



other words, environmental conditions worsen as income increases up to a point--perhaps about US \$5,000 per capita--and then begin to improve.

However, to extrapolate from this study to the conclusion that trade, by promoting growth, will eventually solve all manner of environmental problems, as has been widely done (e.g. Bhagwati, Yu 1994, Esty 1994, Anderson and Blackhurst 1992), is to take a giant leap of faith in the name of neo-classical economics.<sup>3</sup> First, the Grossman and Krueger study looks at only a few pollutants<sup>4</sup>; to expect the same results even for other pollutants, much less natural-resource exploitation and land use, ignores differing production and consumption patterns at different levels of development and different local, national, and global ramifications of environmental quality. Second, the study measures air-pollution intensity per unit of GDP, not overall levels. What is seen as a decrease in pollution intensity--a decrease in the pollution/GDP ratio--in higher income countries is a reflection of rising GDP rather than falling absolute pollution levels.

A related study (Hettige et al. 1992) looking at the toxic intensity of industrial production in relation to levels of economic development in eighty countries found the same inverse U-shape as Grossman and Krueger when measuring toxic intensity per unit of GDP. However, the study also measured toxic-intensity per unit of industrial output, to draw a distinction between change in industrial composition and change in GDP composition. By this measure, pollution intensity does not fall at higher incomes but continues to increase. Likewise, a cross-country study of twenty-five Latin American countries between 1960 and 1988 (Birdsall and Wheeler 1992) finds that pollution intensity continues to grow, though at a slower rate, at higher levels of per capita income. Interestingly, these less optimistic studies are rarely mentioned. Bhagwati (1993a, 1993b) does point out that income increases cannot be

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<sup>3</sup> A strong criticism of this extrapolation is provided by Arrow et al. (1995).

<sup>4</sup> Three pollutants were considered in the study: sulfur dioxide, suspended dark matter ("smoke"), and suspended particulate matter.

tightly linked with decreases in all types of pollution. Nevertheless, he maintains that growth of per capita income will not harm the environment, given that growth directly and indirectly reduces poverty and generates funds for environmental clean-up and protection, while demand for environmental quality also increases with income.

In fairness, it should be noted that Bhagwati is not advocating pure laissez-faire policies. He believes, however, that policy interventions in natural resource sectors should not be made through trade policy but be more directly targeted. Because environmental problems are not directly caused by trade, but rather indirectly by inappropriate government sectoral policies, externalities, and other market failures that shape trade, they should not be addressed with trade policies.

Daly, on the other hand, working from his paradigm of steady-state economics, pictures a world in which resource use has perhaps already exceeded the earth's capacity for regeneration, and where further growth, largely defined as consumption, will only mean more resource degradation. In his view, countries should consume only what they produce, unless in specific cases the benefits of trade can be proven. Daly pictures the economy as a subsystem of the closed, finite ecosystem. Economic growth cannot be expected to go beyond the biophysical capacity of the system. "The issue is whether growth at the current margin, as conventionally measured, is really making us richer. We suspect it is making us poorer by increasing environmental costs faster than it increases production benefits." (Daly and Goodland 1994, p.84) This makes it clear that Bhagwati's underlying assumption is just the opposite: Bhagwati assumes environmental costs are unlikely to exceed the welfare benefits of trade. As evidence to the contrary, Daly points to the doubling of income inequality (UNDP 1992) between the North and South between 1960 and 1990, a real decline in non-fuel commodity prices of 50% in the 1980s (which account for 67% of Latin America's export earnings), and an accompanying fall of 30% in developing country terms of trade. The result has been that a greater physical volume of exports--generally natural resource products--is required to capture the same foreign exchange earnings. Efforts to increase GNP

through trade, according to this view, will increase stresses on natural resources while the welfare benefits of the GNP increase may be less than the environmental costs.

While Daly accepts (Daly and Goodland 1994) that closed and protectionist economies are not necessarily environmentally better-off than open economies, and that environmentally detrimental subsidies and distortions should be eliminated, he also points out the relative difficulty of internalizing costs of environmental externalities under unregulated trade.<sup>5</sup> Scale limits to economic growth and expansion of resource use at both the local and global level are obscured by free trade, according to Daly, because countries are able to import and export environmental services. Most countries in the long run will seek to import those services. "By making supplies of resources and absorption capacities everywhere available to demands anywhere, free trade will tend to increase throughput<sup>6</sup> growth and with it the rate of environmental degradation." (Daly 1993b, p.156.)

#### Integrating Trade and Environmental Concerns

Efforts to reconcile the concerns of free trade advocates and environmentalists have presented facile answers to a complex problem (Esty 1993a and 1994, OECD 1994, Anderson and Blackhurst 1992, Yu 1994). They have focused on the fears of the former that environmental policies and proscriptions will be used to build up new protectionist and distortionary barriers that will limit the welfare benefits of free trade (Muñoz 1994), and on the fears of the latter that free trade and international trade agreements will prevent implementation of environmental policies and limit national control over

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<sup>5</sup> Daly also finds fault with the widely accepted use of the theory of comparative advantage as a justification for free trade, on the grounds that the theory assumes immobility of capital whereas today capital is highly mobile and seeks absolute advantage, i.e. the greatest return on investment. This means that some countries could be left out of economic development completely (that this is happening in Africa today seems clear). The increasing emphasis placed by most developing countries on exports will lead to increased competition, falling prices, and a shortage of importers (see Chapters 3 and 4).

<sup>6</sup> Resource throughput includes both consumption of natural resources and disposal of waste.

resources. In response to the fears of business, a number of theoretical and empirical studies in industrial pollution control have shown that environmental controls do little to limit economic growth or trade (e.g. Leonard 1988, Pearson 1987a and 1987b, Low and Yeats 1992). In response to the fears of environmentalists that developing countries will not adopt sound environmental policies, and that trade agreements (primarily GATT) will prevent countries from using trade policy to control environmentally damaging products and production at home and abroad<sup>7</sup>, two answers are given. First, it is asserted as truth, following Bhagwati's line of reasoning, that the gains from trade will lead to the very development and income increases that will provide both the funds and the demand for environmental controls in developing countries. Gains from trade will also lead to greater industrialization and urbanization, which will reduce pressure on agricultural and other renewable resources (Yu 1994). Second, the standard economic argument that the best tool for an environmental problem (read externality) is not a blunt instrument, such as trade policy, but a specifically targeted environmental policy (e.g. Bhagwati, Young 1994, Pearce and Turner 1990) is frequently repeated. By viewing environmental problems as externalities of particular production processes, the solutions can be limited to focused environmental policies, such as pollution taxes. This approach to trade-related environmental problems has led to the side agreements to the NAFTA and efforts to create a GATT more friendly to efforts to internalize environmental costs.<sup>8</sup>

The common conclusion in these arguments is that, as long as proper environmental controls, such as taxes and charges for environmental services, are in place to compensate for externalities, the welfare benefits of free trade can be enjoyed by all countries.

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<sup>7</sup> The tuna-dolphin case is repeatedly cited as evidence that GATT prevents implementation of sound environmental policies.

<sup>8</sup> The 1987 Brundtland Commission report (WCED 1987), for example, recommends that the Uruguay Round of GATT "reflect concern for the impacts of trading patterns on the environment and the need for more effective instruments to integrate environment and development concerns into international trading arrangements." (cited in Audley 1993, p.192) See also Esty (1993).

The impact of trade and trade liberalization on a country's overall welfare depends on whether the country's environmental resources are correctly priced, which in turn depends on whether appropriate environmental policies (from the view point of the country in question) are in place. If they are, trade and trade liberalization benefit the environment because the resulting increase in economic growth stimulates the demand for environmental protection and generates additional income to pay for it. (Anderson and Blackhurst 1992, p.19)

These efforts to reconcile economic and environmental concerns (e.g. Esty 1994, OECD 1994, Yu 1994, Anderson and Blackhurst 1992) have largely ignored both the large structural changes that are implicit in free trade arguments and the scale question that is raised by Daly in his assertion that we may have already done more damage to our environment than it can sustain. In part this simple response has been possible because the focus has been on the impacts of environmental policy on trade, rather than the reverse; and because the focus has been on industrial pollutants, which are described as point sources and have immediate, measurable impacts on human health. Other resource exploitation, such as land use, is often less clearly definable as damaging at the local level or measurable as damaging at the global level. Yet, international trade clearly plays a critical role in determining production and consumption patterns that affect the environment. The benefits of trade arise precisely from its reallocation of production and the increase in consumption it facilitates.

### Policy and Politics

Politically and policy-oriented examinations of the trade-environment relationship have taken many of these relations among trade, growth, and environment for granted. On the assumption that the way to resolve environmental problems and facilitate free trade is to adjust for market failures and externalities, such studies have investigated the institutional requirements for both national and international environmental interventions, funding, and harmonization of standards (e.g. Hurrell and Kingsbury 1992, Anderson and Blackhurst 1992, Esty 1994). Discussions of the trade-environment relationship in terms of power have also largely reflected these same relations--viewing developed country environmental policy, for example, as a means to relegate polluting industries to developing

countries or, more frequently, as an effort to create new barriers to export of developing country products.<sup>9</sup> Weak environmental policies in developing countries have been decried by developed country industries as an unfair effort to capture comparative advantage. The recent US debate over NAFTA brought these concerns to the forefront. A stronger argument claims that Northern efforts to set environmental standards for the South denies the right of the South to make its own value judgements (Agarwal and Narain 1991, Bhagwati 1993, Esty 1994) and determine its own capacity to absorb pollution. Given conditions in many developing countries, development and poverty alleviation must come before environmental restrictions, even when environmental problems have regional or global impacts.

A more useful political criticism of trade liberalization has argued that developing countries are not able to make their own economic (or environmental) choices in an international market that frequently works to their disadvantage. This is particularly true under free trade regimes. These countries are said to be trapped in a position of dependence on natural resource exports to the US and Europe. This argument has arisen largely in relation to the debt crisis of the 1980s and the wave of structural adjustment programs that has swept the developing world. The need for foreign exchange for debt repayment forces developing countries to export ever increasing amounts of raw materials and environmental services in order to remain solvent (Whiteford and Ferguson 1991, George 1992, Nader 1993). Much of this criticism faults the mishandling of the debt crisis (George 1992, Miller 1992, Morris 1990) or poor implementation of adjustment programs (Reed 1992, Cruz and Repetto 1992). Making a more fundamental argument, criticism based in dependency and neo-structuralist theory points to fundamental inequalities in the trading relationships between the developed and the developing world (e.g. Furtado, Sunkel). These inequalities will inevitably restrict the welfare gains from trade liberalization that can be captured by the developing world. Trade is clearly an essential ingredient in

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<sup>9</sup> See Esty (1994) for a summary of this literature.

development. However, as yet there is little evidence that liberalization--either in terms of reduced domestic market intervention or reduced macroeconomic and trade interventions--will have worse environmental consequences for land use than the market distortions created by government intervention (Sanderson 1992, Dean 1992). Efforts to link structural adjustment to environmental degradation (Reed 1992, Anderson et al. 1994 ) and debt to deforestation (Capistrano 1990, Kahn and McDonald 1995) have had mixed results. These ideas are explored more fully in the following chapters.

### Agriculture and Land Use in the Trade-Environment Debate

The relationship between trade and natural resource exploitation has not been explored as extensively as the relationship between trade and pollution. There are various reasons for the inattention to these issues. First, the trade-environment debate arose originally in the context of the imposition of pollution controls. Second, it is more difficult to draw direct links between natural resource use or land use<sup>10</sup> and measurable environmental degradation, particularly global degradation. Third, the difficulty of defining and applying well-targeted environmental policies to agricultural externalities, such as soil erosion, also explains the inattention to such policies in the theoretical and policy literature. Measuring externalities, or market failures, in this area is clearly more difficult than measuring factory emissions (Runge 1993a and 1994, Blaikie and Brookfield 1987). Nevertheless, although efforts to reduce externalities in the natural resource sectors are still quite new and unproven in the OECD countries, remarkably few questions are raised about the feasibility of applying them appropriately in the developing countries (e.g. Runge 1993a and 1994).

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<sup>10</sup> A distinction can be drawn between trade in agricultural products and in renewable natural resources, such as timber, on the grounds that agricultural products reflect a derived demand for environmental services, such as soil and water, while natural resource products are demanded directly. Discussion of trade in renewable natural resource products, such as timber, is therefore relevant but presents rather different environmental policy options. However, trade in both types of products is based on exploitation of natural resources.

Agriculture and, therefore, land use are the subject of substantial government intervention in both developed and developing countries and, of all productive sectors, are among the furthest from the free trade ideal. The arguments for reducing government intervention are particularly strong in agriculture, where programs are very costly to governments and arguably to the environment. Liberalization in the sector, as anticipated under GATT and promoted by reform efforts in developing countries, will cause major restructuring of land-use patterns on a global level. Models of agricultural liberalization, including the impact of the latest GATT round, predict that removal of trade barriers and substantial reductions in sectoral interventions will lead to a large-scale shift in agricultural production. Production will shift from the developed countries, where prices have generally been held high by government protection, to the developing countries, where prices have often been depressed by government efforts to keep food prices low and encourage industrial development (Zietz and Valdés 1986, Lutz 1990, Schiff and Valdés 1992, Goldin and Knudsen 1990, Krueger et al. 1991). Only a few authors have made a serious attempt to address the environmental consequences of trade liberalization in the agricultural sector.<sup>11</sup>

### Theoretical Approaches

The theoretical economic literature on trade and natural resources is surveyed by Segerson as part of an effort to bring trade theory and natural-resource economics together. Traditional trade models have ignored the role of natural resources while resource economics has largely ignored the role of trade. In addition to examining the well-known problem of externalities, Segerson looks at broader implications of trade for natural resource use. She finds that international markets and trade possibilities will profoundly affect resource-use decisions. While resource use in a closed economy will depend on

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<sup>11</sup> Those discussed here include Segerson (1988), Anderson (1992a and 1992b), Young (1990 and 1994), Runge (1994), Lutz (1992), and Lutz and Young (1990).



domestic preferences, resource use in an open economy will depend on demand and other conditions in international markets, such as the rate of return on other assets (Dasgupta et al. 1978)<sup>12</sup>. The production and consumption functions are separated under international trade--which is exactly Daly's fear. Of particular importance in determining comparative advantage and resource-use patterns is a country's rate of time preference, or discount rate:

Countries that are relatively well endowed with a given exhaustible resource will not necessarily produce and export resource-intensive goods if they are patient and choose to husband their resources while their less patient [or poorer?] trading partners deplete their own domestic supplies. (Segerson 1988, p.26)

Trade increases the possibility of specialization because of differing endowments and rates of time preferences. Small countries, Segerson suggests, may become dependent on agricultural exports in order to finance imports.

A more empirically oriented look at agricultural trade and environmental impacts (Young 1990) also notes the weakness of the literature on the interrelationship between international trade and intensity of resource use. In particular, Young points to the general failure to consider the role of structural change in resource use as a long-run response to policies. His concern is that distortionary trade and sectoral policies have led not only to short-term distortions of consumer costs but also to long-term supply adjustments and investments in environmentally (and otherwise) inappropriate productive activities.<sup>13</sup> Under agricultural trade restrictions farmers produce in areas and use resources in ways that differ from "efficient" free market patterns. Tariff barriers, for example, serve to shore up price supports and facilitate input subsidies and development of monocultures. The impacts of these accumulated distortions are enormous: Young cites figures that the total cost of US agricultural pollution--which he blames largely on market distortions--is equal to as much as 25% of US exports (Clark et al. 1985).

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<sup>12</sup> Segerson (1988) hypothesizes a close linkage between production and trade decisions and capital markets.

<sup>13</sup> "In the case of the environment, the costs are often delayed for five to ten years and become apparent only after considerable structural adjustment and investment in the distorted economy has occurred." (Young 1990, p.198)

Because of diminishing returns, the effects of increases in agricultural intensity do not have a linear impact on environmental quality (Young 1990). Moreover, there are correlations between inputs; an increase in fertilizer use makes an increase in pesticide use more profitable. The effect of liberalization in the developed countries will therefore be beneficial since it will reduce the environmental degradation associated with distortionary interventions. To what degree the extant environmental degradation can be rectified is not considered.

The case of developing countries, however, differs significantly because of the heavy dependence on the agricultural sector and high levels of rural poverty (Young 1990). Protection in the developed countries may have diverted export agricultural production away from the developing countries.<sup>14</sup> However, it is unlikely to have protected environmental quality in the developing countries, both because of low incomes, which preclude a shift out of agriculture, and because of a lower demand for environmental quality. Most developing countries have used national marketing systems to suppress prices and transfer income from rural to urban areas (Bates 1981, Schiff and Valdés 1992). At the same time, input subsidies, which have encouraged overuse of various inputs, have been used to encourage production for food and exports (Farah 1994) and to offset some of the impact of low prices on farmers.<sup>15</sup> Liberalization in the developed countries will raise prices and farm incomes in developing countries, and thus free up money for investments in conservation and environment (Tyers and Anderson 1988), and lead to an improvement in related institutions, such as land tenure (Young 1990). At present poverty and lack of export markets, along with distortionary policies, are resulting in environmentally degrading agricultural practices. Evident from Young's discussion of the impacts of government intervention on the structure of agricultural production is the fact that liberalization will likewise cause

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<sup>14</sup> While many studies of the impact on agricultural production of government trade and sectoral policies can be cited (Tyers and Anderson 1988, Zietz and Valdés 1986, Krueger et al. 1991), these studies have looked at welfare impacts without considering environmental impacts.

<sup>15</sup> Overvalued exchange rates have also served to promote input use.

dramatic shifts in the structure of production, likely to create a new range of environmental challenges. Some policy intervention is still needed to internalize costs and facilitate the appropriate trade-offs between environmental and other objectives (Young 1990). In order to do this, the real costs of degradation must be recognized. Poorer countries, however, are still lacking the infrastructure for reaching consensus on and implementing such environmental policies (Anderson and Blackhurst 1992).

### Policy-Oriented Approaches

Policy-oriented literature reconciling trade and the environment has stressed the environmental degradation or poor use of resources that is a direct result of government interventions in the sector. Prime examples include the European CAP, which has led to the fabled mountains of butter, US quotas which have protected a sugar industry that is destroying the Everglades, and subsidies for cattle ranching in Central and South America that are widely blamed for deforestation (Yu 1994). The fundamental problem from this perspective is that government subsidies, quotas, and other interventions have disguised true comparative advantage and the true cost of resource use in agriculture. An extreme tenet of this effort to reconcile trade and environment holds that most environmentally "bad" policies are also protectionist policies; free trade is the route to environmental reforms (Yu 1994, Runge 1993a and 1994). These reforms will come not only directly from removal of distortionary policies--causing immediate changes in production patterns and releasing government funds for investment in conservation measures--but also over the long-term, through increased urbanization and industrialization, leading to lower population growth and less pressure on agricultural land and less colonizing pressure (Yu 1994, Bhagwati, Southgate 1994).

One point of agreement among participants in the trade-environment debate is that trade alters the international structure and location and intensity of both production and consumption. Policy recommendations view major structural change resulting from trade liberalization is viewed as playing

a positive role in "allocating economic activity in accordance with the environmental capacities and conditions of different countries and promoting the efficient use of resources."(OECD 1994, p.14) This is the case in an ideal world where environmental assets are properly valued and environmental costs internalized. In a more realistic world, production may equally well be allocated to unsuitable areas, not reflective of "natural endowments"(OECD 1994). The optimistic view is that poorly considered interventions in the agricultural sector, from both the economic and environmental perspective, are much more to blame for mis-allocation of production than market failures. Domestic policy reforms undertaken in the context of well-targeted environmental policies will yield the greatest welfare benefits. One author sums up this argument saying "both trade liberalization and environmental regulation have similar aims--to make more efficient use of resources."(Esty 1994, p.65)

While public policy interventions have been largely blamed for overuse of resources in both developed and developing countries, poverty has also received widespread blame for problems in the developing countries. Poor farmers are forced to farm marginal land and clear forests to earn a subsistence income. Government policies have depressed rather than stimulated production, but have failed to conserve resources because falling prices do not reduce output at the subsistence level. Moreover, subsidies for inputs have led to their overuse, including over-application of pesticides (Farah 1994, Runge 1994, Repetto 1985). As long as input subsidies are abandoned, the shift in production from developed countries to developing countries is expected to be accompanied by a substitution of labor for chemical inputs in the South, implying a global decrease in chemical inputs. Moreover, it is suggested that commercial agriculture will absorb surplus agricultural labor, reducing pressure on marginal lands and discouraging shifting cultivation practices that are widely blamed for deforestation (Runge 1994, Anderson 1992b). However, experience with commercialization of agriculture does not support this optimism (Ropke 1994, Williams 1986, Leonard 1989). Concerns are raised about the changing commodity composition of trade, particularly increased specialization, intensification and

extensification, and increasing use of inputs such as water, fertilizer, and chemical inputs related to the production of export crops (Whiteford and Ferguson 1991, Ritchie 1993, Leonard 1989).

Anderson (1992a) also takes a largely empirical look at the environmental and welfare effects of liberalizing world trade in food commodities. Case studies, in his view, are necessary to be certain that liberalization in particular markets will be environmentally friendly. It is "even conceivable" that negative environmental effects of trade may outweigh the benefits of increased consumption in some cases. Anderson (1992a and 1992b) finds that, in general, environmental damages are likely to be more than offset by improvements in welfare, and adopts the usual optimistic viewpoint that, even if environmental problems are created by trade, low-income countries can simply impose "optimal environmental policies." Using a partial equilibrium model in the case of world food markets, he finds that liberalization in the developed countries alone will increase welfare in both developed and developing countries and will lead to less chemical-intensive food production. Liberalization in both developed and developing countries will lead to even greater relocation of production and improved welfare for poor countries.<sup>16</sup> More chemicals are likely to be used in low-income countries under higher food prices, but increases would not offset decreases in high-income countries. Overall, welfare gains will amount to US\$ 17 billion per year for developing countries, three-quarters of which will accrue to Latin America, if the industrialized countries liberalize. If all countries liberalize, there will be US\$ 33 billion in gains for developing countries and US\$ 107 billion globally.

Anderson largely dismisses the question of land-use change and deforestation that might accompany liberalization of world food markets, on the grounds that

...empirical studies suggest that the land area devoted to agriculture in developing countries is not very responsive to changes in the prices of farm products, and that the extra output would instead come almost entirely from a more intensive use of existing farmland. (Anderson and Blackhurst 1992, p.14)

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<sup>16</sup> Even food importing countries will gain through import substitution away from industries in which they do not have a comparative advantage (Anderson 1992a).

Anderson, like most economists addressing the issue, blames poor public sector policies, such as tax incentive schemes and poor property rights, for deforestation and land degradation, following the work of Mahar, Binswanger, and Repetto among others.<sup>17</sup>

Some questions about the fundamental optimism of these studies are raised by Lutz (1990 and 1992). Based on various models of agricultural trade liberalization (Zietz and Valdés 1986, Goldin and Knudsen 1990), Lutz suggests that the overall environmental impact for developing countries will be negative as agricultural production shifts to those areas. The concomitant environmental improvements in the developed countries may or may not outweigh the negative effects in the developing countries. While the other authors have held that negative impacts in developing countries will be significantly offset by both income effects, leading to greater investment in conservation, and employment effects, reducing pressure on marginal and frontier lands, Lutz expects both of these effects to be small. First, population growth and the large pool of un- and under-employed labor in developing countries is such that increases in employment in commercial agriculture are unlikely to reduce land pressure. Increasing returns and employment opportunities may even attract labor to the sector. Second, expenditures on conservation are likely to be small. The economic benefits of liberalization, however, can be expected to outweigh the environmental costs for these countries.

Lutz reviews several studies of agricultural sector responses to policy changes in Latin America. These have found that, in the short-run, the greatest response to price changes takes place in variable inputs, such as pesticides, fertilizers, and wages, followed by changes in labor and machinery inputs. The slowest response to price changes is in the land area cultivated. This response, however, can be quite substantial. In a study of Argentina, Cavallo (1988) found that a 30% drop in prices led to a reduction in land under cultivation of over 14%, over a twenty-year period. In a study of Brazil, Lopes

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<sup>17</sup> If deforestation does occur, and rich countries put a high enough value on retaining that forest, they have the option of paying poor countries to maintain the forest, according to Anderson (1992a).

(1977) found similar patterns, but also distinguished between small and large farm responses. Large farms had a very significant response to price increases in all factors, including land. Small farms, where most land is under continual cultivation, had a much smaller response. Countries with a large commercial farm sector can therefore be expected to adjust land use more rapidly to changes in trade conditions. However, these findings must be considered in conjunction with the fact that trade conditions can also result in considerable changes in land ownership and property rights as perceptions of the value of land change (Ekins et al. 1994).

### Shortcomings of the Debate

Current discussions of trade and environment, and trade and agriculture, have failed to adequately address several critical issues. Primary among these is the importance of the scale and structural nature of the changes that occur with increasing trade pressures and improving trade opportunities, generated by the international economy, for developing country natural-resource-based products. Neither the cumulative effects nor the irreversibility of land-use change are addressed in the current debate. Yet, changing trade patterns can clearly cause dramatic shifts in land-use with striking environmental implications not only at the local and regional levels, but also at the global level.

Land-use change is among the primary causes of both local and global environmental change. The local impacts that have immediate and long-term repercussions for agricultural production include, but are not confined to, soil erosion, soil degradation through nutrient loss and salinization, degradation of grasslands, depletion of aquifers, disruption of local hydrological and climate patterns, and a reduced range of possibilities for response to global change. Changes occurring in land-cover and land-use patterns at the local level contributing to globally cumulative effects include biodiversity loss and changes in carbon and nitrogen cycling, which contribute to global climate change (see Chapter 1). Attempts to designate most environmental problems as local or national (e.g. Bhagwati) and to resolve

those problems with local, targeted measures ignore the increasingly regional and global nature of all environmental degradation. Even if all environmental problems could be accurately described as some form of market externality or failure within a defined local or national market, the possibility of ever internalizing the myriad of environmental costs associated with agriculture is nonexistent.<sup>18</sup>

By restricting the debate primarily to externalities and market failures, the larger question of the environmental consequences of the regular functioning of international markets is overlooked. If benefits are to be realized from trade, trade must change production patterns and land-use patterns. By definition, any substantial change in land use causes environmental change, which may or may not constitute degradation. As countries are held more and more responsible for their contribution to global change, through international agreements on biodiversity and climate change for example, at the same time that they are under international pressure to open their borders to trade, the role of international economic forces in determining resource-use patterns will be increasingly at issue.

A second critical issue which has been insufficiently acknowledged by the trade-environment debate is the peculiar position of developing countries in the world trading system. The structural limitations faced by these countries in international markets have been widely discussed in development literature (Chapters 3 and 4). But the impact of these constraints on the environment has gained little attention apart from efforts to assign blame for environmental degradation to heartless multinationals.<sup>19</sup> To understand the role of trade in Latin America's natural-resource sectors, consideration must be given to the source of the region's comparative advantage in natural resources and to the role that trade-related

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<sup>18</sup> Even Esty admits, "The nature of environmental problems exacerbates the valuation problem and thus the tension between environmentalism and free traders. In particular, ecological problems are characterized by threshold effects; time lags between emissions and detection, biological, chemical and physical interactions that are not well understood; and sometimes substantial scientific uncertainties over the source, scope and magnitude of public health or habitat damage." (1994, p.40)

<sup>19</sup> The widely publicized hamburger connection, linking the US fast-food industry to Central American deforestation, and the Bhopal disaster are the most notable examples.



growth plays in alleviating or aggravating stress on the environment locally and globally. Largely ignored in the trade-environment debate is the fact that developing countries hold a comparative advantage in agriculture not solely and perhaps not even primarily because they have a relative abundance of agricultural resources (e.g. productive soil, sufficient water, suitable weather) in comparison with developed countries. That agricultural production will shift to developing countries in no way implies that the natural resource base there is better suited to supporting agricultural development. Rather these countries have a relatively small industrial sector and large agricultural sector, pressing needs for foreign exchange, and little control over prices or markets, where they have a limited range of exports to offer.

Comparative advantage often stems from a conjunction of historical and international macroeconomic conditions rather than resource-abundance patterns or environmental suitability at the local and, more clearly, at the global level. What appears as a comparative advantage in the marketplace is a competitive advantage rooted not only in factors of production but also such historical developments as infrastructure investment, accumulated knowledge, and established marketing networks. The dynamic effects of trade may create trade opportunities, or a "specialization trap," from which countries have difficulty diversifying (Ropke 1994). Of relevance to the comparative advantage arguments for free trade is the fact that patterns of specialization that exist today are not the product of a free trade system. For example, industrial countries have established a competitive advantage, if not a comparative advantage, in manufactured goods. Given that terms of trade favor manufactured goods, they will seek to maintain that advantage. It is crucial therefore to look to historical trade patterns as a key to resource use probabilities rather than solely to theory.

Also largely unaddressed is the impact of economic growth, expected to result from liberalized markets, on land use. The Grossman and Krueger curve--which has been liberally extrapolated to all environmental problems--appears even less applicable to agricultural problems than to industrial

pollution problems. Although resource-use patterns will change with increasing GDP and incomes, growth necessarily entails more resource use:

If the structure and behavior of the economy generates pervasive negative environmental externalities, proportionate economic growth will increase the absolute level of externality, ie the environmental damage. At present this situation is hardly an exception, but more of a rule. (Ekins et al. 1994, p.17, also Ropke 1994)

While poverty has been widely blamed for land degradation, the record of developed countries shows little evidence that higher incomes lead to investment in agricultural conservation or improved resource-use patterns. To the contrary, there is evidence that post-War growth has created more environmental problems than it has solved (Meadows 1972), though the nature and location of the degradation may have changed. The environmental problems becoming apparent today are more global and more irreversible than those earlier problems for which relatively easy solutions have been defined.

While growth in the developing countries based on trade liberalization may reduce some industrial forms of environmental degradation by reducing the level of capital-intensive industry in developing economies, such growth is predicated on expansion of production in the primary sectors. Both extensification and intensification of agricultural production will be necessary to increase exports and raise incomes, and will have important environmental consequences. These environmental consequences can be expected to include local degradation and to contribute to global change.

Finally, the assumption of much of the trade-environment literature that trade expansion will precipitate economy-wide growth, which would presumably relieve pressure on natural resources, must be considered within the context of Latin America's historical reliance on primary sector exports. In the literature on development, the role of primary products in promoting economic development has long been central to consideration of the relation of trade to development processes. Whether Latin America's heavy reliance on such exports in the 19th century or the closing of the region's economies in this century was more effective in promoting economic growth has been the subject of much debate. At present the pendulum has swung in favor of economic opening and export promotion, although the feasibility of

development based on primary exports remains uncertain. The belief that trade will always promote development, like the theory that trade will promote sound environmental management, is based largely on the theory of comparative advantage. Yet changes in trade patterns will create both winners and losers in developing countries as comparative advantage shifts, and both can be expected to make use of natural resources in new ways. While the benefits brought by trade are undeniable, the environmental impacts cannot be expected to be benign.

Critiques of comparative advantage theories and of reliance on primary products for economic growth will be discussed in the following chapters. They point to dependence on unstable markets, pressure from foreign exchange demand, poor or worsening terms of trade for commodities, and the failure of primary product export sectors to promote development of other economic sectors. Chapter 3 will examine structuralist economic arguments further. Chapter 4 will look at historical relations and the evolving debate over trade and resources in Latin America in the context of development theories, in an effort to understand the relation of trade opportunities and exigencies to expanding resource exploitation.

### CHAPTER 3 RETHINKING TRADE-ENVIRONMENT RELATIONS

Chapter 2 pointed to several issues which have been inadequately treated by the trade-environment debate, namely the determinants of comparative advantage in resource-based products, the peculiar position of the developing countries in the world trade system, and their dependence on natural-resource-based exports for foreign exchange. Each of these factors are important in shaping trade patterns and natural resource use in ways unrelated to traditional understandings of comparative advantage and rates of exchange. These underlying trade drivers have been given serious consideration in analyses of development and the international economy, but without reference to the implications for natural resources.

A number of structuralist theories<sup>1</sup> describing trade constraints and exigencies in development, posited before the current swing to liberalism and now neglected, bear reconsideration in light of natural resource concerns. These theories focus primarily on foreign exchange pressures, terms of trade, and demand-side limits on exports. The issues of concern here are gaining consideration today not from development literature, which increasingly stresses the efficiency and benefits of integration into world markets, but from the new trade theory, which has introduced concepts of structural, historical, and policy determinants of comparative advantage and trade patterns to mainstream economics. Although this literature has not yet incorporated natural resource questions, it suggests some directions for thought.

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<sup>1</sup> In justification of structuralist macroeconomics, Taylor states, "An economy has structure if its institutions and the behavior of its members make some pattern of resource allocation and evolution substantially more likely than others." (1983, p.3) Structuralist macroeconomics takes these factors into account; neoclassical economics does not.

This chapter will begin by reviewing the static and dynamic arguments for free trade, and some structuralist critiques of these arguments. Comparative advantage formation and foreign exchange constraints will be discussed as determinants of trade opportunities and exigencies, and as determinants of the scale of trade. The first group of factors discussed relates primarily to what is exported; the second to how much is exported. The final section will deal directly with several policy responses--import-substitution industrialization (ISI), export promotion, liberalization--that have attempted to control the direction and shape of trade in developing countries. Each of these policies acts as a filter through which the external and internal determinants of trade pass, reshaping but not fundamentally altering the pressures on natural resources that arise from external and internal imperatives to trade. The ideas developed here provide a framework for the empirical chapters which follow.

### Free Trade Arguments

The arguments for free trade lie at the root of trade theory. In the static, Ricardian model of trade, free trade increases consumption and production possibilities, as countries trade those goods they produce relatively efficiently for those which other countries produce relatively efficiently, in accordance with the theory of comparative advantage. The gains from trade are simply the increase in production and consumption made possible in both countries by trade and are, by definition, an increase in welfare.<sup>2</sup> This model reveals that, at any given point of development, a country will gain materially from trade. If the gains are redistributed, free trade creates the possibility of a gain in social welfare (Corden 1984). The Heckscher-Ohlin model explains the determination of comparative advantage in terms of relative abundance of factors of production. A country will have a comparative advantage in production of those

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<sup>2</sup> According to Michaely (1977), it is not welfare per se that is measured by gains from trade but rather "the value of the goods (in terms of one of them) which could be taken away from the community when it pursues a free trade policy and still leave it as well off as it is under tariff protection." (cited by Corden 1984, p.101)

goods which use its abundant factor relatively intensely. The gains from trade can then be explained in terms of resources, as follows:

Trade provides benefits by allowing countries to export goods whose production makes relatively heavy use of resources that are locally abundant while importing goods whose production makes heavy use of resources that are locally scarce. (Krugman and Obstfeld 1991, p.4)

The original static arguments on the gains from trade have been supplemented more recently with dynamic arguments on competitiveness, capital accumulation, and technological change. These dynamic arguments for trade are emphasized today in light of structuralist and dependency critiques of the static gains argument. The gains from trade in the dynamic model include increased efficiency, or productivity, catalyzed by competition<sup>3</sup>; growth through increased efficiency and expansion into new markets; and improved efficiency from increasing returns and economies of scale. In other words, trade will facilitate growth of domestic productive activities. Clearly export sector production will expand. Moreover, while static arguments for trade suggest that the import-competing sector, that is, the relatively less efficient sector of the economy, will be decreased by trade, dynamic arguments suggest that it may be strengthened by international competition.

Although dynamic free trade and laissez-faire arguments are arguably theoretically distinct (Corden 1974)<sup>4</sup>, both assume that economic efficiency and increased aggregate consumption are desirable goals best obtained through markets. Just as laissez-faire arguments stress the inefficiencies created by government interventions, today's turn to neoclassic liberalism stresses the role that government domestic interventions play in distorting the economy as a whole and thus distorting trade patterns. Corden (1984) describes this as the "theory of domestic distortions." The main point to be

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<sup>3</sup> These are gains beyond the increase in production made possible by change in the product mix under the static model.

<sup>4</sup> Corden traces the history of the free trade arguments from their origin as a special case of laissez faire, to the break in the link between the two in the post-War period (Corden 1974). I would argue that the two are being confounded again in much current policy literature.

derived from this approach, which is central to much of economic reform today, is that trade interventions are not the best way of dealing with distortions or problems which are essentially domestic rather than trade-induced. This argument appears in the trade-environment debate as an assertion of the inefficiency of trade measures in reducing environmental degradation (e.g. Bhagwati). Protectionism is deemed costly because it reduces efficiency in both the import-competing and export sectors; sectoral interventions are often subject to the same critiques.

Elimination of trade barriers and sectoral interventions are both part of the broader policy of liberalization advocated for developing countries today. Yet, a larger set of issues--poverty, income distribution, resource use, and many others--affect the question of free trade. These issues are generally the basis for government interventions in markets, interventions which illustrate the political inefficiency of market solutions to resource and income allocation. While this paper cannot address these reasons for government intervention, the (non-economic) rationality of intervention should be borne in mind.

In terms of resource-use questions, the free trade argument can be seen in two lights. First, it requires the belief that increased consumption is equivalent to an increase in welfare. As increased consumption is more than likely to entail increased natural resource use, it will not necessarily create an increase in welfare if the environmental impacts are considered. For countries which find a comparative advantage in natural-resource-based exports, natural resources will pay for imports of all types. Second, the free trade argument is premised on the belief that trade and competition will increase efficiency of production. To the extent that this increased efficiency is derived from increased efficiency of resource use, rather than labor or other factors, it may be environmentally beneficial. However, in the agricultural sector, increases in productivity are generally obtained through intensification entailing mechanization, monocropping, and high levels of inputs. Many of the resources affected by productive processes, particularly by associated land-use change, are not directly used in production. Examples include biodiversity resources and carbon storage. Efforts to improve the productive efficiency of agriculture

will focus on conservation of soil and water resources but may ignore these other affected natural resources.

### Comparative Advantage, Commodities, and Developing Countries

Neoclassical theory recognizes only quantitative differences between the developed and developing countries, not qualitative differences. Dependency theory and various structural arguments have stressed the asymmetry of economic relations between developed and developing countries.<sup>5</sup> Both structuralist and neoclassic interpretations of the effects of trade on developing economies have centered on the dynamic impacts of trade. However, structuralist interpretations of the implications of the theory of comparative advantage for developing countries suggest very different policy responses to trade than the neoclassic interpretation. Instead of the dynamic gains from trade--increased efficiency, expanding markets--structuralist interpretations see dynamic losses in terms of lower growth rates and impediments to development.<sup>6</sup> Several particularly problematic issues have been raised that relate to resource use. First is the question of the real determinants of comparative advantage and factor abundance. Second is the question of the vulnerability of the commodity markets, which are central to developing country trade. Third is the question of the extent to which dependence on commodity-based export sectors traps countries in peripheral status in the world economy

### Factors of Production and Relative Abundance

Ricardian theory states that countries will export those products which they produce relatively efficiently. For most developing countries, especially before the spectacular growth of the Asian NICs,

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<sup>5</sup> Essentially, neoclassical economics argues for "monoeconomics", that there is not qualitative difference between developed and developing countries, whereas much of development economics argues that developing countries face problems not addressed by neoclassical theory (Hirschman 1984, Streeten 1984).

<sup>6</sup> Development here is defined as industrialization and rising relative incomes.



primary commodities were therefore justifiably the main export. The Heckscher-Ohlin theory adds that countries will export those products which are intensive in the relatively abundant factors of production. For many developing countries these factors are labor and natural resources. The key term here is "relative". Comparative advantage in resource-intensive or land-intensive products does not reflect an absolute abundance in those factors but rather a relative scarcity of capital, including investment, human, and technological capital. The relative efficiency of the commodity sectors reflects the relative inefficiency, or non-existence, of an industrial or technological sector. It does not reflect an absolute, or even a relatively strong, national environmental capacity for commodity production.

The factors which are relatively abundant in developed countries--capital, technology, education--are not "natural" but created endowments. Only if trade is looked at from a static perspective does it seem obvious that developed countries should export capital-intensive products while developing countries should export natural-capital-intensive products. From a dynamic perspective, the arguments for efforts to reshape trade patterns to promote development are more logical.

#### "New" Trade Theory and Qualifications to Comparative Advantage

New trade theory<sup>7</sup> makes several arguments to show that trading patterns are not solely determined by traditionally understood comparative advantage. Essentially new trade theory argues that markets are imperfect, and that economies of scale, increasing returns, and monopoly power matter to the development of exports. The theory focuses on industrial patterns in the developed countries, but could be expanded to explain patterns of commodity production in the developing countries (Krugman 1989). Relative abundance of resources is the first determinant of comparative advantage, but "arbitrary" advantages in historical development, policies, and infrastructure, among others, are

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<sup>7</sup> Paul Krugman is the leading voice of the self-designated "new" trade theory, especially on location of production. See also Helpman and Krugman (1989), Helpman and Razin (1991), Grossman and Helpman (1991), Baldwin (1992), and Krugman and Venables (1995).

secondary determinants.<sup>8</sup> Particular countries are successful in exporting a product not just because they produce it relatively efficiently, or because of underlying differences in resources. Successful development of exports also depends on historical specialization and exploitation of economies of scale (Krugman).<sup>9</sup>

Three elements determine the location of production according to new trade theory literature: comparative advantage in factors; economic and trade policies that shape that advantage and provide support for development of economies of scale; and random specialization (Krugman). The theory therefore allows a more important qualification to the traditional theories of comparative advantage than it acknowledges. This qualification is that structures and history, complicated by government intervention, together play a key role in determining comparative advantage. Once this qualification is accepted, any argument for a strong correlation between absolute resource abundance and development of export industries becomes suspect. Misguidedly, much of the trade-environment policy literature either assumes that there is such a correlation or that relative environmental capacity or tolerance for degradation is more important than absolute capacity.

Primary commodities are not exempt from advantages of economies of scale and increasing returns (Krugman 1989). All exports are processed to some extent, even if the "processing" is simply provision of transportation, and many primary products require more extensive processing before export. Even for crops produced on small farms, there can be important economies of scale at the marketing and

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<sup>8</sup> The divergence between domestic and autarky prices "is only a proximate explanation of the gains from trade: the underlying explanation must derive from all those factors that lie behind the sources of comparative advantage, differences which give rise to the divergences between autarky and free trade prices." (Corden 1984, p.72)

<sup>9</sup> The theory therefore indicates that government intervention may lead to welfare gains from trade greater than under undistorted equilibrium. This raises the question of the impact of export promotion efforts on natural resources. The answer will lie in the nature of those efforts.

export end "that give the overall pattern of primary-product trade a definite non-comparative advantage element," (Krugman 1989, p.356), an element that is arbitrary.<sup>10</sup>

Even though trade between developed and developing countries may be determined by underlying comparative advantage, "increasing returns in the provision of infrastructure can play a crucial role in the detailed structure of that trade." (Krugman 1989, p.359) Krugman adds, "I would venture a guess that scale economies and the associated phenomenon of arbitrary specialization play a larger role in primary product trade than most people think." (1989, p.356) Some developing countries will be lucky and others not, both in their initial resource endowment and the extent to which they are able to exploit it.<sup>11</sup> This makes it worthwhile for individual countries to offer incentives either to exporters or to providers of marketing infrastructure to ensure that they win a market share. Overlapping comparative advantage in tropical and subtropical commodities and inelastic demand for commodity exports under global competitive conditions<sup>12</sup> do not foster sound resource use. The trend toward production of crops generally suited to temperate regions, notably grains (Barkin et al. 1991), may be indicative of this competition.

Efforts to capture comparative advantage in export commodities through marketing and infrastructure advantages have left a long legacy of effects. Exploitation of resources by foreign

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<sup>10</sup> Krugman offers the following illustrative example, "Suppose that along a coast there are a number of countries that could all produce an export crop, say bananas. We imagine that these countries are all initially identical in their resources. However, to export bananas requires construction of a piece of infrastructure--say a banana dock--that cannot be built below some minimum scale. Let us finally say that the world market is sufficiently small that only a few banana docks can profitably be built--say one or two....One or two countries would be chosen as sites for docks, and they would become the exporters of bananas. Which countries took on this role would be indeterminate." (Krugman 1989, p.357)

<sup>11</sup> Bulmer-Thomas's concept of the "commodity lottery", discussed further in Chapter 4, captures two of the arbitrary features here, first the natural resource endowment of a country, and second, unstable international demand for particular commodities.

<sup>12</sup> Competition occurs not only among Latin American countries but also with Africa and other regions, and will continue as long as transport costs are low.

companies can be included. More recently the trend toward modernization in the style of developed countries, including mechanization and heavy use of inputs, reflects more "efficient" marketing approaches, which provide a more uniform product and reliable marketing mechanisms.<sup>13</sup> The costs of building the economic and marketing capacity for production based on a large number of small-scale producers are often much higher than for large-scale production from a few large producers. The result is that even a labor-abundant developing country may opt for capital-intensive production at the expense of labor (Myint 1984). This style of agricultural modernization clearly entails a range of environmental changes directly associated with the new techniques. As will be shown in the case of Brazil, this capital-intensive and land-extensive form of agricultural development also has a large number of indirect environmental effects related to displacement of agricultural labor and displacement of food-crop production.

There are two main links between protectionist tenets and the new trade theory. The first is the traditional infant industry argument which proposes that temporary protection is necessary to establish a new industry. Import-substitution arguments extended this concept to encompass entire economies. The second is the argument that protection can increase market power and promote increasing returns, which will perhaps serve as a springboard for entry into international markets.<sup>14</sup> New trade theory, however, maintains the current skepticism about the ability of the state to effectively and accurately implement such policies without creating excessive domestic market power and without supporting entry of inefficient producers into the domestic market (Krugman 1989). Nevertheless, Krugman admits that development is bound to be uneven because higher capital levels are cumulative.

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<sup>13</sup> See for example Sanderson (1986), Reynolds et al. (1993), and Williams (1986).

<sup>14</sup> This argument is described as "import protection as export promotion." Krugman (1990) points out that it is only feasible in large domestic markets (of which Brazil may be one).

### The Commodity Trap

Trade and development literature has been particularly concerned with the effects, as well as the causes, of the concentration of developing country exports in primary commodities. This concern was perhaps the most important post-War theoretical influence on developing country trade policies until the turn to liberalism in the 1980s. Much reaction against free trade is a reaction to the belief that comparative advantage dictates that developing countries should continue in their role as primary commodity exporters (Krueger 1984). The theories of Prebisch and Singer are discussed in greater detail in Chapter 4. Here it will suffice to summarize their concerns as follows. First, terms of trade for commodities will deteriorate over the long-term, steadily reducing the gains from trade for developing countries<sup>15</sup> and causing a decline in developing country welfare (in relation to constant terms of trade). Second, commodity markets are notably unstable, so that in addition to the long-term decline in terms of trade, developing countries must also suffer frequent economic shocks as commodity markets fluctuate. Both declining terms of trade and market instability will limit investment in development. Later dependency theory is even more pessimistic in its view that developing countries are condemned to playing a peripheral role in the international economy, with little hope of policy solutions to this under-development trap (see Chapter 4). These concerns provided the rationale for developing country efforts to industrialize and diversify away from primary commodities through protectionism.

Fundamental to this understanding of commodity markets are export pessimism and belief in demand-side constraints. Terms of trade will deteriorate because developed country demand for primary commodities, and even simple manufactures, is inelastic. While supplies of commodities, worldwide, are virtually unlimited, exports of primary products are limited by inelastic developed country demand.

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<sup>15</sup> Interestingly, Ricardo posited that terms of trade would turn in favor of the primary product exports because of the natural physical limitations on commodity production (Findlay 1984). However, the point at which that constraint is reached, or at least recognized, may be long after irreversible environmental damage has been done.

Individual small exporting countries, which are price-takers in commodity markets, may increase revenues by raising output or increasing efficiency. However, increasing competition among commodity exporters will lower prices but will not increase demand significantly. In cases where developing countries are not price-takers in markets, such as Brazil in the coffee market, efforts to expand exports would be self-defeating (Krueger 1984). Moreover, developed countries have taken deliberate steps to curtail demand through protectionist policies.<sup>16</sup> The other side of the export pessimism coin is the idea that any growth in developing countries will increase demand for imports, which is highly elastic, thus preventing a current account improvement. The Lewis model (Lewis 1984), taking a slightly different approach, focuses on the unlimited supply of labor in developing countries in addition to the elastic supply of tropical commodities. As wages rise in the developed countries and not in the developing countries, terms of trade will deteriorate. Neoclassical theory, on the other hand, assumes away both structural questions and under-employment questions (Findlay 1984).

Various efforts to prove and disprove the declining terms of trade theory have had mixed results<sup>17</sup>, precisely because of the variability of commodity markets. The real impact of this variability on economies is difficult to determine, but can be very significant for countries heavily dependent on commodity exports and countries with heavy debt burdens (Long 1981).<sup>18</sup> In terms of agricultural land use, the variability is clearly important. Expansion and contraction of production may entail land-clearing and agricultural intensification, causing long-term changes in land cover without long-term increases in production.

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<sup>16</sup> Good reviews of US and EC policies on primary commodity and labor-intensive manufactures are found in Abreu and Fritsch (1987) and McCulloch (1981).

<sup>17</sup> Depending on the start and end years chosen very different results can be "proven." Prebisch and Singer (1950) found deterioration of terms of trade between 1870 and 1930. Spraos (1980) surveyed the evidence and found the opposite; Grilli and Yang (1988) found a secular price decline for commodities but no fall in purchasing power. A recent revisit of the issue by Singer (1984) gives some support to his original arguments.

<sup>18</sup> Long (1981) argues that price shocks have been among the most important external shocks to LDCs in recent decades.

### Internal Terms of Trade and Comparative Advantage

One critical determinant of trade patterns that has gained attention in the literature favoring liberalization is the internal terms of trade. The liberalization literature discusses policies shaping internal terms of trade as distortionary influences on comparative advantage.<sup>19</sup> In some instances, domestic policies that alter comparative advantage from its free trade state do so unintentionally. However, much of the industrial- and agricultural-policy programs of developing country governments represents a deliberate effort to change or reshape a country's comparative advantage. In the short run, this is accomplished through tariffs, quotas, subsidies, price-setting, and other mechanisms which turn the internal terms of trade in favor of industry, import-substitutes, or traditional or non-traditional exports. In the long run, the intention is to catalyze a permanent structural change in the economy, generally away from primary commodities toward industry, to reconstruct comparative advantage.

Developing country policies therefore have tended to turn internal terms of trade away from agriculture and especially domestic food production, with industry protection. At the same time, developed country policies have generally favored agricultural sectors through protectionism. The result is that developing country imports of food have risen along with their exports of manufactures (Figueroa 1981). The agricultural export sector therefore faces increasing competition in international markets and increasing demand-side constraints. The developed countries have created a comparative advantage in agriculture by turning agriculture into a capital-intensive sector. Developing countries continue to rely primarily on land abundance to improve the relative profitability of agriculture.

The impact on agriculture and labor, particularly domestic-use agriculture, of deteriorating internal terms of trade is at least threefold. First, agricultural productivity can be expected to experience slow or negative growth in comparison with other sectors; investment in the sector will be low. Second,

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<sup>19</sup> This literature includes Krueger (1992) and Papageorgiou et al. (1991).

to the extent that other sectors fail to absorb "excess" labor from the agricultural sector, marginal agricultural production will expand. Third, to the extent that agriculture is still a critical source of foreign exchange earnings, government policies are apt to favor export crops. Promotion of export crops, as will be shown in the case of Brazil, is often accomplished through modernization and mechanization, which only worsen the internal terms of trade for domestic-use agriculture and further aggravate agricultural under-employment. Whether considered as a problem of government-induced economic distortions, inequalitarian land tenure systems, or unfavorable terms of trade, sectoral under-employment is the immediate cause of much agricultural expansion into marginal lands and of the consequent environmental degradation.

#### Rates of Exchange, Foreign Exchange, and Trade

Trade patterns and the value of commodities are not determined solely by supply and demand for developing country goods. A nexus of macroeconomic and monetary factors beyond supply and demand for goods shapes markets for commodities. A few of these factors are explored here, including international terms of trade and unequal exchange; foreign exchange shortages and constraints on imports and exports; and real exchange rates.

The traditional view holds that the agricultural sector is only weakly linked to macroeconomic factors, at least in developed countries where the elasticity of demand is low. In the short-run, however, the elasticity of supply is even lower. Because agricultural prices adjust more rapidly than manufacturing sector prices, monetary shocks are not neutral in the short-run. Most agricultural models incorporate weak price responsiveness, and price policies are often thought to be ineffective because of price inelasticity. Nevertheless, exchange rates are considered to be one of the main influences on US agricultural exports (Abbott 1988). This paradox is explained by the relationship between the exchange rate and other macroeconomic outcomes which affect the levels of demand in international agricultural



markets. Macroeconomic outcomes and exchange rate changes affect developed country agricultural sectors in several ways. There is a link between the exchange rate and interest rates, which can significantly change costs in agriculture, so that there is a link between exchange rates and expenditure. There is also a link between exchange rates and capital flows, and therefore credit availability. Finally, exchange rates affect income levels through change in foreign demand and foreign exchange earnings in importing countries.

The linkages for developing countries are stronger. First, the large relative share of agriculture in both GDP and exports means that shifts in exchange rates significantly affect the size and growth of both the domestic and export agricultural sectors, thus affecting overall economic growth. Shifts in exchange rates therefore directly affect land use. Second, levels of foreign exchange earnings determine capacity to finance investment and repay debts. Shifts in exchange rates can alter this capacity rapidly, and increase or decrease pressure on the agricultural sector to expand export production. Third, exchange rates affect domestic incomes. In developing country markets, income elasticity of demand for agricultural products is much higher than in developed countries. So domestic products will experience reduced or increased demand with income changes. Land use for domestic agriculture is thus affected through changes in demand and in employment. The structuralist approach presents agricultural policies as an effort to "break the link between domestic and international prices and ...to protect the agricultural sector." (Abbott 1988, p.303)

#### International Terms of Trade and Unequal Exchange

The question of declining relative commodity prices discussed above is closely related to terms of trade and unequal exchange questions. Terms of trade<sup>20</sup> is a slippery issue; measures of terms of trade

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<sup>20</sup> International terms of trade is defined as the price of a country's exports divided by the price of its imports. As terms of trade improve, a country captures a larger share of the welfare gains from trade, and vice versa.

are purely relative and can only be presented as an index. The export price of natural-resource-based products is therefore expressed in terms of the imports they will purchase. There is no absolute measure of the rate of exchange or the distribution of gains from trade between two countries. Terms of trade can be said to improve or worsen, but not to be fair or unfair, equal or unequal, in numerical terms.<sup>21</sup> The following discussions will explore the reasons why terms of trade are, if not unfair, at least distorted away from purchasing-power-parity (PPP).<sup>22</sup>

The issue of "fairness" of terms of trade was raised by theories of unequal exchange (Emmanuel 1972), which were rooted in the Marxian idea of value based on labor. Because products incorporating a day's labor from developing countries were exchanged for products incorporating less than a day's labor from developed countries, the exchange was seen as "unequal." Those countries which "have" acquire more, while those countries that "have not" lag further behind (Findlay 1984). One weak point in this argument is that products incorporate much more than labor (Findlay 1984).<sup>23</sup> A measure of exchange based on labor alone fails to consider other inputs. Yet the unequal exchange model sheds some light on the export of natural-resource-based exports. A measure of the natural-resource inputs to exports tells us more about the rate of exchange than labor, insofar as export of resources often represents a permanent draw-down of domestic resources (natural capital) that employment of labor does not. If the corresponding imports do not reduce demands on natural resources, for example by lowering pressures on agricultural land, the exchange will be, if not unfair, at least untenable over the long-run.

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<sup>21</sup> Findlay notes, "The determination of the terms of trade is, at one and the same time, an esoteric technical problem in the pure theory of international trade and a highly charged emotional issue in world politics." (1980, p.425)

<sup>22</sup> The theory of absolute PPP holds that the exchange rate between two countries' currencies is equal to the ratio of the two price levels. Relative PPP holds that the percent change in the exchange rate will be equal to the percent change in price levels.

<sup>23</sup> Moreover, unequal exchange does not mean that a country does not gain from trade. The comparison should be made between labor to pay for imports with labor for import-substitution to see the gains (Krugman and Obstfeld 1991).

Countries may be trading away, or exporting, out of existence, not only their own resources but also global resources.<sup>24</sup>

### Foreign Exchange Requirements and Import Constraints

The discussion above should make it clear that development of trade patterns is not based solely on an exogenous resource endowment. Nor is there any rate of exchange between imports and exports that is justifiable outside of short-term demand and productivity patterns. Natural resource use reflects an opportunity to exploit resources, not necessarily a particular abundance of resources. A second range of international factors, namely those affecting the current and capital accounts and foreign exchange demand also dictate trade patterns. The trade and development literature has drawn attention to these issues. These factors are perhaps less important in determining the type of trade, that is the product mix, than in determining the scale of trade. They reflect an exigency to trade more than opportunity to trade. For countries facing foreign exchange constraints, resources often have a much higher value as exports, or by extension as import-substitutes, than they have in the production of non-traded products.

The concept of the foreign exchange "gap", introduced in the 1960s (Chenery and Strout 1966)<sup>25</sup>, has largely dropped from academic and policy discussions, but still fairly accurately describes the problem of foreign exchange for developing countries. According to the theory, investment and growth in developing countries is limited by their access to foreign exchange, by the gap between foreign exchange earnings and import requirements. Because industrialization requires imports of technology

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<sup>24</sup> In this sense, importing countries are also losing environmental benefits because of trade.

<sup>25</sup> Useful discussions of the two-gap model, domestic savings and foreign exchange gaps, are also found in Findlay (1984) and Donnelly (1984). The foreign exchange gap model predicted the 1980s debt crisis accurately, though it did not explain the accumulation of reserves in the 1970s as well.

and capital goods, foreign exchange is vital to development.<sup>26</sup> Since the beginnings of the debt crisis, the foreign exchange gap has been primarily the result not of the need to cover import costs but of the need to meet debt payments. To prevent a slowdown in growth, the foreign exchange gap must be manageable. The model assumes export pessimism, that is, that the limitations on developing country exports are on the demand side. If foreign exchange is acquired through loans, even larger quantities of foreign exchange will eventually be required for repayment (Donnelly 1970). Foreign exchange acquired through the trade sector does not create this difficulty; hence the imperative to adjust foreign exchange requirements through the trade sector. Thus the justification for more open economies, loose regulatory environments, and attraction of foreign exchange earnings through FDI.

The main point is that developing countries are generally struggling to obtain badly needed foreign exchange, to close the gap, in the face of demand-side limitations on export earnings. Demand for foreign exchange therefore shapes the trade decisions of developing countries. Import-substitution policies responded to the need to reduce the gap by lowering imports. More recently, liberalization, exchange-rate adjustment, and export-promotion policies have been employed in efforts to reduce the gap by expanding exports. However, getting the price of foreign exchange rate "right" today means devaluation, hence more exports are needed to earn an equivalent amount of foreign exchange.

The growth constraints imposed on developing countries by foreign exchange limitations have received an interesting theoretical treatment by Leff and Delfim Netto (1994). They create an economic model of ISI policy effects based on Brazil. The findings of the model include 1) ISI may simply lead to higher deficits at a higher income level; 2) the balance of payments deficit continues because the effect of rising incomes on imports outweighs the effect of import substitution on imports; and 3) import substitution, with or without FDI, will have a large impact on national income. Leff and Delfim Netto

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<sup>26</sup> Much international aid is still premised on this understanding of development constraints. Structural adjustment programs explicitly recognize the need to generate foreign exchange.

(1994) argue that foreign exchange availability in developing countries is the key variable in import demand. Imports are limited not by prices or economic growth but by access to foreign exchange. Increases in foreign exchange simply increase imports--low import levels are due to the difficulty of earning foreign exchange. In other words, the share of imports (imports/income) is simply the share of foreign exchange (foreign exchange less current liabilities/income). Developing countries with high rates of growth can be expected to have a high marginal propensity to import. Any additional foreign exchange earned goes for imports as pent up demand for imports is satisfied.

The dilemma created by this relationship between exports and imports is that domestic growth may not alleviate the constraints on foreign exchange or reduce the need for imports (Leff and Delfim Netto 1994). The foreign exchange gap cannot be closed. Rather, domestic growth may have the contrary effect of diverting production away from the export sector toward the domestic sector, as has been done deliberately with ISI policies, at the same time that growth increases the demand for imports to support domestic expansion. Efforts to increase foreign exchange availability through import substitution (i.e., through promotion of domestic growth) will only increase demand for imports. Given that developed countries have much higher import ratios than most developing countries, it is unreasonable to assume that imports will fall as economies grow. This catch-22 situation is compounded by other difficulties in increasing exports, namely the demand-side constraints on many developing country exports, which set these countries on the import-substitution path in the first place, and the chronic overvaluation of exchange rates, resulting from ISI packages, that prices exports out of the market.

The constraints illuminated by this model are not absolute, as accumulation of reserves in the 1970s and Latin America's success in generating a trade surplus in the 1980s (table 4.8) has shown. However, the model is useful heuristically in showing the nature of the limits of trade as a development tool. In terms of resources, the implication is that there are no upper bounds on the levels of resource-

based products developing countries will export, given sufficient international markets. With chronic unmet demand for foreign exchange, exports will be increased when possible.

Approaching the problem of Brazilian exports from another direction, Carvalho and Haddad (1981) looked at drivers of exports of manufactures and primary products. The supply functions for manufactured and natural-resource-based exports have been examined in a number of studies, looking at exports as a function of real exchange rates, world imports, GDP, and capacity utilization.<sup>27</sup> Carvalho and Haddad, looking at Brazilian exports in the late 1970s and early 1980s, found the strongest correlation between manufactured exports and world markets. Export promotion incentives seemed to have little impact on export expansion, although other studies have found a strong correlation (Clements 1988). A clear correlation was also found between real effective exchange rates and export supply response. Looking at natural-resource-based exports, Carvalho and Haddad found much lower elasticities of supply response than for manufactures. However, the two strongest correlations remain world demand and the real exchange rate. The lower elasticities for natural-resource-based exports are not surprising given the relative inflexibility of production and the range of restrictions placed on exports in Brazil. Carvalho and Haddad conclude that in the absence of such restrictions the supply response of natural-resource-based exports would have been stronger. World demand and real exchange rates, which reflect demand for a country's products to some degree, are among the primary determinants of export performance.

The main constraint on exports of resources is on the demand side, which is partly market driven and partly a result of developed country protectionist policies. Supply-side constraints have been created by developing countries through exchange-rate overvaluation, quota systems, and other anti-export measures. Insofar as development or employment is restricted by limits on imports, the terms of trade between developing and developed countries regulate the rate of growth in the former (Findlay 1984).

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<sup>27</sup> Clements (1988) provides a useful summary of these studies.

Whether increased efficiency of production in the commodity export sector is of any benefit to developing countries is questionable. If price elasticity of demand for commodities is low, more efficient production may simply worsen the exporter's terms of trade. This is a serious consideration for countries such as Brazil which are price setters in commodity markets.

### Exchange Rates

Exchange rates, like terms of trade, are a relative measure. The immediate determinant of an exchange rate is not the pattern of comparative advantage or even reciprocal demand for country products but demand for currency. Although the theory of purchasing-power-parity (PPP)<sup>28</sup> states that prices will be equal across countries, assuming no transport costs or trade barriers, in fact commodity competition and demand for currencies skew the market to the disadvantage of developing countries. Real exchange rates<sup>29</sup> are not consistent with PPP, as concern about unequal exchange has shown. Both fixed and floating systems have contributed to inequalities in international prices. The system of fixed exchange rates skewed international prices by allowing countries to maintain over- or under-valued currencies in order to protect domestic economies or promote exports. With the end of the Bretton Woods system of fixed exchange rates<sup>30</sup>, there has been a vast expansion of international capital markets and capital flows. International financial flows far exceed the value of trade, despite rapid growth in world trade. Although thinking on exchange rates tends to focus on trade, exchange rates are determined now as much or more by capital and investment flows as by trade (Thompson 1988, Schuh 1988). The

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<sup>28</sup> Efforts to find empirical evidence of PPP have been generally unsuccessful (Krugman and Obstfeld 1991), but prices are clearly distorted by policy interventions as well as underlying structures.

<sup>29</sup> The real exchange rate is the ratio of one country's goods and services to another's, or to a multi-country average. It is defined in terms of price levels and the nominal exchange rate. The nominal exchange rate refers to the relative price of two currencies.

<sup>30</sup> Although the developed countries have floated their currencies, developing countries have often maintained exchange rates fixed to one of the major currencies. Exchange rates have continued to be used as policy instruments (Shane and Stallings 1988).

demand for a country's currency is related less closely to demand for goods produced by that country since the expansion of capital flows.

This change in the exchange rate regime has brought exchange rate policy to a central position in macroeconomic policies. Developing countries are now structuring incentives to attract FDI at all costs; in Latin America, Chile has led the way. Because agriculture is both an export and an import-competing sector in many developing countries, it is particularly affected by the new exchange rate regime<sup>31</sup> both on the import and export side. Capital and financial flows create both short-term volatility and multi-year swings in foreign exchange markets, which can obscure underlying comparative advantage in tradeables (Schuh 1988).<sup>32</sup> The importance of these swings for natural resources may be greatest in the effect on investment.<sup>33</sup> The possibility of both unprofitable investment and forgone profitable investment is raised. Changes in production patterns, expansion of agricultural land, and investments in agricultural infrastructure may appear unprofitable after a change in exchange rate. Yet such investments, whether production continues or not, may cause irreversible environmental changes. In agriculture, Schuh asks "how does a country position itself vis-avis these long swings, especially when many of the investments needed to strengthen agriculture, such as agricultural research, tree crops, and irrigation projects have long gestation periods?" (1988, p.237).

The monetary approach to the balance of payments tells us that trade imbalances are countered by an offsetting capital flow. Today, it appears that capital flows are offset by trade flows, insofar as

<sup>31</sup> The relevance of real exchange rates to agriculture is a fairly new idea in the US literature (Schuh 1974). Concern with exchange rate effects on agriculture in the US developed in response to rapid changes in export levels in the 1970s.

<sup>32</sup> "We tend to think that exchange rates are determined by underlying competitive advantage, and fail to recognize the importance of domestic savings rates, monetary and fiscal policies, and capital flows." (Schuh 1988, p.236)

<sup>33</sup> "These unanticipated and unpredictable exchange rate movements can either generate unanticipated windfall gains or unanticipated low or even negative returns to farm investment. Investments that appeared profitable ex ante on the basis of one set of exchange rate expectations may prove to be disastrous ex post if the exchange rate moves significantly against the sector." (Thompson 1988, p.224)



the exchange rate that governs trade is not based primarily on the value of, or demand for, goods. Given the substantial debt obligations of the developing countries, obligations which bear no relation to their export capacity, the financial side of the balance of payments--i.e. the capital account--cannot be ignored. The foreign-exchange price which a country is able to command for its goods, natural-resource-based or otherwise, may bear more relation to the country's need for foreign exchange for imports and debt service than to the (domestic) value of the resources. We can imagine a demand curve for foreign exchange where a country is stuck at a high point. Because only a small part of demand can be satisfied the country is willing to pay a very high price.<sup>34</sup>

Governments have influenced and frequently deliberately manipulated exchange rates for different purposes. The persistent overvaluing of the exchange rate in many developing countries under ISI polices, which taxed exports and subsidized imports, worked against agriculture from both sides (Schuh 1988). Exports were taxed and food prices held low. (Of course, this was exactly the intent of the policy, which reflects not only foreign exchange strategies but also the relative political power of rural and urban sectors.) Stabilization and adjustment policies in recent years have tried to correct for this overvaluation, in order to encourage exports, increase price incentives to agriculture, facilitate modernization, and promote growth. Governments have also used devaluations in a deliberate effort to undervalue, or at least lower the value of, the exchange rate in order to increase export earnings. That is, governments have tried to manipulate demand abroad--at least their share of demand--by lowering the foreign currency price of their products. While more production is then required to earn the same amount of dollars, pounds, mark or yen, demand expands as well. If production is to meet expanded demand, physical production, through land-use expansion and agricultural intensification, must exceed the change in the exchange-rate value. However, the scale of government intervention in the agriculture sector may buffer agricultural prices from changes in the real exchange rate, thus reducing production

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<sup>34</sup> It as an old story that a dollar is worth more to a poor man than a millionaire.

response (Abbott 1988). Given the variability of exchange rates in both the short and long term, government support of low-cost exports appears as a reasonable hedge against uncertainty.

### The Value of Resources

Given this market context, exploitation of the natural resource base for export purposes may reflect a demand for foreign exchange more than a comparative advantage in the resource base for such products. Poor terms of trade for primary commodities have often been pointed to as one of the root problems underlying both Latin America's underdevelopment and inefficient, i.e. destructive, resource exploitation. Various schemes have been put forward to increase the relative price of commodities for developing countries on an international level<sup>35</sup>, and developing countries have made their own attempts through import substitution, production controls, and price cartels. The fact, however, that developed countries too remain large exporters of commodities, though admittedly not of tropical commodities, suggests that commodity values are not so low as to render them unprofitable.

This under-valuation of developing country commodity exports is at least in part a result of "over"-valuation of foreign exchange, resulting from the difficulty of meeting import and debt service requirements. The high demand for foreign exchange raises the value of use of natural resources, primarily use of land and forests, for production of exportables above the value of use for production of domestically consumed products. That is, the domestic opportunity cost of resource use for export appears low.<sup>36</sup> It is not so much the systematic under-valuation of export commodities as the consistent over-valuation of their earnings potential which is critical in determining resource use. The high value

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<sup>35</sup> The unsuccessful New International Economic Order and the successful Generalized System of Preferences (GSP) both sought to provide more resources to developing countries for development from strengthening commodity markets (Fishlow et al. 1978, Abreu and Fritsch 1987). Arden-Clark (1991) puts forth a proposal for better commodity markets to provide more resources for environmental protection.

<sup>36</sup> Domestic opportunities include not only production for domestic use, which may entail additional benefits in income distribution and employment, but also conservation.

given to foreign exchange arises not, as a general rule, in the export sector but rather in the industrial and consumption sectors, through import and debt-service requirements. In a way this is the reverse of Dutch disease: Rather than an overvalued exchange rate produced by one highly demanded commodity rendering exploitation of other resources unprofitable, the consistent over-valuing of foreign exchange leads to widespread resource exploitation. Natural resources provide a cheap means of obtaining valuable foreign exchange as long as the only costs considered are the costs of extraction, payable in domestic currency. Under these circumstances of a reverse Dutch disease, the foreign exchange value of many natural resources will be high enough to promote their extraction.

#### Environmental Degradation and Exchange Rates

Not surprisingly, a stronger correlation has been found between deforestation and exchange rates (Capistrano 1990 and 1994) than between deforestation and other macroeconomic indicators. The correlation can logically be expected to extend to agricultural land use as well. The fact that import substitution in agriculture has occurred when demand for foreign exchange has been depressed and vice versa suggests that foreign exchange requirements play a large role in determining whether land is used for domestic-use production or for exports. Although high levels of debt clearly increase the demand for foreign exchange, several studies have failed to find a strong connection between debt levels and deforestation (Kahn and MacDonald 1995, Capistrano 1990).<sup>37</sup> Sanderson (1992), however, suggests that the immediate impact of the 1980s debt crisis on natural resources was felt not through expansion of exports but through reduced imports.<sup>38</sup> Agricultural production was expanded to supply domestic

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<sup>37</sup> The Brundtland Commission (WCED 1987) was the most venerated voice to stress the link between debt and environmental degradation, although the connection has been widely accepted.

<sup>38</sup> See also Shane and Stallings (1988) for an economic explanation of this phenomenon. In many developing countries the bulk of import cuts were in the manufactures sector, so that agricultural products rose as a share of imports even while experiencing an absolute decline.

demand, without reducing exports, and overall agricultural production and exploitation of the resource base increased.<sup>39</sup> This again suggests the heavy weight of foreign exchange demand in determining resource use. Foreign exchange required for debt servicing has been obtained at the expense of imports, and has entailed the costs of agricultural expansion. Agriculture is firmly based in natural resource exploitation. If commodities are undervalued in terms of their opportunity costs in domestic use even without taking into account the economists' environmental "externalities", once costs from soil erosion to global warming are included, they are severely undervalued.

### Policy Responses

Developing country policies have responded to both the fears about the implications of the theory of comparative advantage for development and to the persistent need to generate foreign exchange in a variety of ways, none of which have considered the value of resources outside of the foreign exchange value. These policies cannot be discussed in a purely theoretical way, outside of their historical context (see Chapter 4), but an attempt is made here to generalize their results.

All of the policies discussed here can be seen as products not only of a response to external constraints and imperatives but also as a result of domestic political, social and economic pressures. The focus here will be limited to external relations shaping policies. Evaluation of efforts to manage trade relations must consider how well they foster development and how well they promote a move away from resource (over) exploitation. Krueger suggests that the central question in trade-related policies is "the extent to which special circumstances in developing countries vitiate the usual free trade dicta" (1984,

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<sup>39</sup> Schuh (1988) paints a different version of the agricultural supply response to the devaluations associated with the debt crisis. Schuh points out that not all of the supply response in agricultural exports need come from increased production. Some part of the adjustment will come through a reduction in domestic demand. Even without an overall increase in production, exports can increase. However, this explanation fails to give sufficient weight to the expansion of land use and production that occurred in the 1980s.

p.520). The other central question which must be raised is the extent to which natural resources should be governed by free trade dicta.

### Import-Substitution Industrialization

ISI policies responded to a number of developing country concerns about trade. First, ISI was premised on the belief that the dynamic effect of international trade was more likely to condemn developing countries to a niche in the trading system based on commodity exports than to promote development. Second, it was premised on the belief that terms of trade for commodities were not only likely to worsen but were already poor and therefore unfair. Third, they offered a solution to the foreign exchange gap and external restrictions on imports<sup>40</sup> through the reduction of imports, especially consumer goods.

ISI creates a high effective rate of protection.<sup>41</sup> Internal terms of trade are shifted in favor of industry, to the disadvantage of exports and agriculture. Agriculture is "taxed" to provide cheap food and investment funds for industry. Sectoral income inequalities are often aggravated as capital-intensive industrial growth fails to provide jobs for displaced agricultural workers. Generally overvalued exchange rates increase imports and restrict exports, to the extent that trade is otherwise unregulated. Growth in the volume of exports slows or stagnates, and there is little change in composition. While consumer imports are limited, domestic industrial growth, especially under the aegis of government subsidies, creates increasing demand for imports of intermediate and capital goods. Trade openness may be

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<sup>40</sup> In the 1930s and 1940s, as will be discussed in Chapter 4, limits on imports were on the supply side. ISI policies of the 1950s were based on the expectation that the international economy would experience a downturn after World War II as it had after World War I (Singer 1984).

<sup>41</sup> While an even-handed protectionist policy lowers efficiency, the non-uniformity of most tariff structures increases the level of distortion in an economy. Relative rather than absolute effective rates of protection are thus culpable for distortion (Corden 1984). Effective rates of protection "normally take into account all policy-induced distortions affecting the tradeable sector directly." (Corden 1984, p.103) They include measures of tariffs, export taxes and subsidies, import quotas, and sometimes consumption taxes and subsidies on inputs, and production taxes and subsidies.

reduced but that does not ensure an improvement in the trade balance. Borrowing (or foreign aid) must expand to reduce the foreign exchange constraints. "The ISI policy eventually founders on the shortage of foreign exchange as requirements for intermediate imports and capital goods rise more rapidly than domestic production can replace imports of final goods." (Meier 1990, p.192) The foreign exchange constraint is not relaxed. ISI policies have generally been abandoned in the face of external sector pressures.

Several critics argue that ISI policies aggravated the foreign exchange gap (Krueger 1984, Meier 1990, Findlay 1984).<sup>42</sup> Numerous other studies have pointed to the stultifying effects of ISI policies, asserting that not only the static gains from trade but also the dynamic gains were sacrificed by interventionist, protectionist policies.<sup>43</sup> According to this understanding, in the 1950s and 1960s countries that followed ISI policies faced periodic foreign exchange shortages. Export earnings increased slowly and were channeled into domestic industries.<sup>44</sup> In combination with fixed exchange rates, this shortage created inflationary pressures (Krueger 1984). Demand for foreign exchange in the industrial sector rose as new industries and investment programs were generally import-intensive. This line of reasoning, however, does not consider the foreign exchange constraints or the form of development that might have arisen under more liberal policies.

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<sup>42</sup> "The handicap on exports, together with the import intensity of the ISI strategy itself, tightened the foreign exchange constraint. There was an increasingly stringent exchange control regime and a growing dependence on foreign capital." (Meier 1990, p.182) Findlay states "Import substitution strategies, apparently designed to eliminate a foreign exchange 'gap,' may thus be the cause rather than the cure for the problem to which they are apparently addressed. Another way of putting this point is that the rate of growth of export earnings, which the two-gap approach tends to take as simply given, is an endogenous variable that depends, among other things, on trade policy itself." (Findlay 1984, p.220)

<sup>43</sup> See, for example, Lal and Rajapatirana (1987).

<sup>44</sup> "The policy instruments employed to encourage the development of domestic industry were so all pervasive, and employed to such a degree, that policy regimes were genuinely dichotomous: the height of protection has been so great in most IS regimes that development of economic new export industries (and even expansion of existing ones) was largely choked off." (Krueger 1984, p.528)

Insofar as import substitution creates strong domestic industries and serves as a springboard for industrial exports (Krugman 1990), long-term change in the composition of exports may be achieved. Success along these lines has been limited to a few countries.<sup>45</sup> Import substitution may reduce pressure on land resources from the export sector but poor sectoral prices and under-employment may increase marginal production. Insofar as ISI is more favorable to domestic-use agriculture than other policies, it supports small-scale producers, limiting labor displacement and industrial-style agricultural development. Import substitution in agriculture, on the other hand, fosters expansions and intensification of land-use, generally with a capital-intensive orientation.

### Export Promotion

Export promotion appears in two forms, first in conjunction with ISI policies and second in conjunction with economic liberalization policies. Export promotion seeks to resolve the foreign exchange problem by expanding exports. Insofar as the government favors particular export sectors, it serves to reshape comparative advantage, so that there is both a volume and a composition effect in exports. In conjunction with ISI policies, export promotion serves to provide the foreign exchange necessary for purchase of inputs to the industrialization process. It offsets the anti-export bias of ISI policies. In conjunction with liberalization policies, it serves to increase foreign exchange earnings to pay for rising imports.

Export-led growth and export promotion policies are based on the idea that specialization in labor-intensive goods and commodities will produce a relatively high rate of profit that can be plowed back into the economy for both development and growth purposes (Findlay 1984). Meier (1990) argues that export promotion is more effective than ISI in closing the foreign exchange gap, because the domestic-resource cost of earning foreign exchange is lower than the (ISI) cost of saving foreign

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<sup>45</sup> Dornbusch (1992) points to Brazil, Korea, and Japan as "parade cases" of gains from protectionism.

exchange. Export promotion policies therefore have been more successful in promoting growth and raising income levels.

Export promotion policies, as distinct from liberalization and laissez-faire policies, use government intervention to turn the internal terms of trade in favor of the export sector, and usually to promote diversification of exports. These interventions create a new set of "distortions" which are likely to encourage exploitation of resources for export. In a country which relies on primary commodity exports, these policies will encourage exploitation of natural resources. Unfortunately, the high level of competition in the commodity sector suggests that international prices would allow only minimal profits, which would not go far in promoting industrialization or paying debts. "Right pricing" of resources is unlikely under these policies.

### Liberalization

Liberalization policies are premised on the arguments for free trade, belief in the validity of exchange rates in adjusting markets and, currently, anti-statist sentiment. The turn to liberalism has been given impetus by the failure of more populist macroeconomic policies to prevent debt crises and runaway inflation (Dornbusch and Edwards 1991). The debate now focuses on how to best carry out trade reform, rather than how to shape trade patterns (e.g. Papageorgiou et al. 1991). Trade liberalization is combined with a more general move toward reduction in state interventions; protectionism is seen as one aspect of overly intrusive state policies. Markets are considered to be the most efficient way to improve overall welfare, the first best solution. Even in cases of market imperfections or failures, the state is rarely considered sufficiently competent or apolitical to intervene without creating further economic distortions.

The export pessimism inherent in ISI and protectionist policies seems to have been disabused by the rise in commodity prices in the 1970s and the relative success of the export promotion economies.



Renewed growth in the developing countries is generally predicated on increasing exports. The suggestion that not all developing countries can achieve success at once through export promotion is belittled as a fallacy of composition (Findlay 1984, Dornbusch 1992). But with many countries "simultaneously reducing capital formation as well as imports, increased export sales become extremely difficult." (Shane and Stallings 1988, p.261, also Singer 1984) Exports today face both slow growth in developed countries, and the protectionist response to slow growth. There are two considerations on the demand side of the developing-country export equation. First, even under free trade would industrial country imports of developing country products be sufficient to meet the foreign exchange requirements of these countries? Second, given the history of protectionist barriers to developing country commodities and labor-intensive goods, how realistic is the expectation that such exports can be increased across the board? Without strong growth of international markets, an increase in exports from one developing country is likely to come at the expense of another. Assuredly, increasing competition to produce cheap commodities for export will lead to both intensification and expansion of agriculture without supporting investment in conservation.

Agricultural liberalization in the developed countries, foreseen in the latest GATT round, should raise the earnings potential of resource-based exports from developing countries. Increasing international prices for agricultural exports can be expected to raise the value of the land used for production (Lutz 1990, Sanderson 1992). If international prices for agricultural products rise in developing countries in response to liberalization in the developed countries, more marginal land can be expected to be brought into use. Use of inputs--including "bads" such as chemicals and inefficient irrigation and possibly "goods" such as soil and water conservation efforts--can be expected to increase. Overuse of inputs in developing countries is frequently blamed on input subsidies. However, higher commodity prices may have the same effect on input use as lowering input prices, since it will lower the

price as a percent of income. Once we accept that "externalities" are a pervasive rather than a marginal phenomenon, the implications become enormous.

### Conclusions

To summarize, the qualifications to free trade arguments are numerous. The above discussion has pointed to the fact that an apparent comparative advantage in natural-resource-based exports does not reflect a particular environmental capacity for resource exploitation. Comparative advantage is defined in relative terms, and is often based on historical patterns of development rather than natural endowments. Whether specialization according to apparent comparative advantage in primary products will impede development along other lines is an open question. It is clear, however, that the position of developing countries in the international economy creates distortions through unmet demand for foreign exchange, distortions that are likely to promote resource exploitation geared toward the short-term. Exchange rates and terms of trade have given greater value to manufactured goods than to commodities. These considerations are more fundamental than those generally raised in the trade-environment debate.

## CHAPTER 4

### RESOURCES AND TRADE IN LATIN AMERICA

Export of natural resources and agricultural products has been central to the economies of Latin America from the early colonization period until the present. Not only have exports been composed primarily, and at times virtually exclusively, of primary products, but viable export sectors have been critical to the functioning of Latin American economies and governments. Historically, Latin American trade patterns have been largely determined by foreign demand for resources and the capacity to extract those resources. Two key sets of questions have been widely debated in relation to the heavy reliance on a limited range of resource exports. First, to what extent has trade in primary products obstructed or catalyzed economic development in the region? Second, to what extent can Latin American countries control those trade patterns or to what extent are they structurally determined at an international as well as national level?

A third set of questions, which has remained largely undiscussed, asks what has been the effect of Latin America's trade patterns on use of the region's natural resources? Natural resource use can be expected to reflect trade factors both through direct exploitation and through the shape or "style of development" (Sunkel 1980, Cardoso 1980) of an economy dependent on natural resource extraction and exports. The present trade-environment debate makes some strong assumptions about the role of trade in development and in society's use of the environment, namely that growth in trade leads to economic growth, and that both free trade and growth can be expected, on balance, to improve resource use (see Chapter 2). Evidence from a review of the historical patterns of resource use generally fails to support those assumptions. The Latin American experience with limited international market participation

shows little evidence of improved resource use. This chapter will briefly consider the various periods in Latin American economic history, looking at the role of trade and the evolution of economic policy responses, and at the critical role played by resource-based exports and import substitution. Exports have been central to theories about economic development. These theories, elaborated sometimes before and sometimes after the relevant economic policies have been established in practice, provide additional keys to understanding the place of trade in determining resource-use patterns in Latin American economies.

Resource exploitation has remained central under widely diverse economic regimes, varying primarily with foreign demand, international prices, exchange rates, and available transport and technology. Only occasionally has domestic policy been used successfully to reshape trade patterns and to reduce dependence on imports of goods and capital. The continuing reliance on exports has been the result of both the failure to create domestically based development in much of the region, and internal and international market pressures on primary commodities. Economic development<sup>1</sup>, to the extent and in the form that it has occurred, has not served to relieve pressures on natural resources. Neither outward-oriented liberal regimes nor inward-oriented protectionist regimes have created a model of development that avoids intense resource exploitation. This pressure on resources, reflected in deforestation, landscape change, and resource depletion, derives from both foreign demand patterns and from domestic requirements for income and foreign exchange. Demand for particular products abroad creates an opportunity for exports. Domestic need for foreign exchange and the persistent foreign exchange gap create an exigency to trade (see Chapter 3). These two forces have driven resource use and land-use change in Latin America. As environmental degradation is increasingly recognized as a global problem, however, the limits on the capacity of Latin America's environment to bear continuing exploitation gain greater import.

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<sup>1</sup> Development is often assumed to entail a move away from a land-based or agricultural economy to an industrial economy.

Current economic thinking links the development of countries with exploitation of comparative advantage (e.g., Cline 1983, Balassa et al. 1986). To what extent Latin America's resource-based exports reflect a comparative natural-resource advantage in such exports remains uncertain. This comparative advantage is at once the result of a failure to construct less resource-dependent development and of the high value placed on foreign exchange, which lowers the relative prices of resources (see Chapter 3). The argument will be made that Latin America's propensity for natural-resource exports is rooted, first, in the region's inability to overcome development hurdles that would allow for a repositioning in the international trade sphere. This propensity is rooted, second, in the region's chronic demand for foreign capital and imports which prevents delinking from that sphere. Efforts to construct a comparative advantage in industrial exports and to create self-sufficient economies have had limited success; moreover, they have continued to rely on (undervalued) natural-resource inputs. The persistent under-valuation of natural-resource-based exports in international markets and the more serious over-valuation of their foreign exchange potential in domestic markets aggravates the tendency toward unsustainable use. International demand rather than scarcity shapes production patterns. The 1980s debt crisis has exposed anew the vulnerability of Latin American economies and resources to international forces.

Foreign demand for resource-based commodities and domestic need for foreign exchange alone cannot dictate resource-use patterns. Production for domestic use is obviously another part of the picture. Although domestic agriculture has often played second fiddle to export agriculture in terms of political and economic weight, periods of inward-orientation and industrialization have been marked by resource exploitation for domestic use. Domestic growth has eliminated neither domestic nor international pressures on Latin American resources.

Environmental limitations clearly play a large role in defining the possibilities open to exporting countries. The most obvious examples are in mineral exports--without large deposits of nitrates or

copper, Chile could not have become a leading exporter in those commodities. In agricultural crops the limits to production possibilities are less absolute, but types of soils and climates, prevalence of disease, and a variety of other factors have determined production and export possibilities. Constant efforts to overcome these environmental limitations on production through improved crop varieties, irrigation, and chemical inputs have led to some expanded production and export possibilities. The long history of Brazilian efforts to produce plantation rubber illustrates the efforts to overcome such obstacles (Dean 1987).<sup>2</sup> The "commodity lottery", a term adopted by Bulmer-Thomas, perhaps most accurately describes the division of natural resources among the Latin American countries. The commodity or commodities drawn by a particular country in this lottery has important effects on its success in the international economy and on the possibilities for economic development away from resource exploitation.

Since the colonial period, export of mineral and agricultural commodities has been central to the economies of the Latin American countries. From independence until World War I all the countries of the region followed an export-led growth strategy based on exports of primary products. The late 19th century, most notably, was a period of relatively liberal, open trade policy. The export sector responded to the demands of the Industrial Revolution with rapid growth in output. The economic shocks of the two World Wars and the intervening Great Depression, however, led most of the larger countries to turn toward inward-looking policies in the 1950s, policies that often discriminated outright against exports. Nevertheless, foreign exchange earnings essential to the industrial development strategy of the period continued to depend on primary commodity exports, and agriculture provided domestic inputs to

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<sup>2</sup> After years of failure, Brazil is finally having some success with plantation rubber production (Brooke 1995, Dean 1987)..

<sup>3</sup> While Bulmer-Thomas (1994) uses this term as a central, explanatory, concept in his analysis of Latin America's development difficulties, the idea that the type of commodity produced in a country shapes development possibilities is central to a number of theoretical discussions of Latin American development (Furtado 1976, Cortés Conde 1992, Thorp 1984), and the term was coined by Diaz-Alejandro.

industry. By the late 1960s, there was a renewed emphasis on export promotion, which became a primary policy concern when the debt crisis of the 1980s expanded foreign exchange requirements. Today, export-led growth has again become a central tenet of development doctrines.

This chapter will look at resource use in general, of which land use is a subset, but with some particular attention to agriculture. This will provide a basis for the discussion in the Brazil case study, which will focus on agricultural land use. A strong degree of equivalence in the behavior of agricultural land use and other forms of resource exploitation can logically be expected. The extraction of natural resources in general can logically be expected to follow a similar pattern to the extraction of resources through agriculture. The forces driving trade and domestic consumption will affect timber, mineral, and agricultural extraction in similar ways, given the goal of earning foreign exchange through exports or import substitution. Economic development and changing economic policies over the years have at times reduced the reliance on earnings from resource-based exports but have never eliminated their key role in these economies. As exports have expanded, sometimes in conjunction with domestic-use agriculture and sometimes displacing domestic-use agriculture, the loss of forests and natural grasslands to agricultural land has been spectacular. The continuing conversion of land and evolution of land-use patterns today reflect continuing changes in trade patterns.

### From Colonization to Independence

The colonial economies of Latin America were founded largely on exports of precious metals. Apart from the production of sugarcane in Northeast Brazil, established in the 16th century, agriculture played a small role. Those areas not endowed with silver and gold deposits were largely ignored in the early stages of colonization. The enormous environmental changes which accompanied the conquest of the New World have only just begun to be explored (Crosby 1972, Merchant 1989, Super 1988). In addition to the decimation of local populations, environmental changes included the introduction of new

species, disruption of traditional production patterns, and systematic efforts at deforestation.<sup>4</sup> The extent to which the introduction of European food crops changed land-use and consumption patterns is uncertain<sup>5</sup> (Super 1988). So is the extent to which less sustainable agricultural practices were introduced.<sup>6</sup> Evidence suggests that local populations were slow to adopt European foodstuffs. European livestock, however, appears to have been much more rapidly assimilated and expansion of livestock production probably created some of the larger scale land-use changes (Crosby 1972, Super 1988, Furtado 1976).

Production in the colonial period was geared toward export of precious metals to Iberia, and external demand kept the colonial economies alive.<sup>8</sup> Mercantilist trade restrictions were designed to ensure not only that regional exports would return to the Iberian peninsula. Restrictions on domestic production and inter-colonial trade ensured the reliance of the region on continued trade flows between the New World and the Old (Bethell 1987). What income returned from the export sectors was, in the main, reinvested in export sectors rather than domestic production (Grunwald and Musgrove 1970). The value returned in imports, however, did not equal the value of exports (Furtado 1976). The colonial powers extracted a surplus. Agricultural production supplied the export centers. Chilean agriculture,

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<sup>4</sup> Some discussions suggest that the rapid population decline may have led to significant reforestation. A corollary to this thesis is that marginal farmlands may have been taken out of production (Super 1988), thus reducing the impact of agriculture.

<sup>5</sup> Larson (1988) provides a thorough discussion of changes in production in one region of Bolivia.

<sup>6</sup> Concern with sustainable practices has sparked a debate about the loss of traditional practices in Latin America. Whether or not these practices were sustainable is uncertain. One theory, for example, proposes that Mayan civilization collapsed because of resource degradation (Sabloff 1995).

<sup>7</sup> Interestingly, concern in recent decades with the expansion of cereal production (Barkin et al. 1991, Grindle 1986) suggests that consumption preferences are still evolving towards European grains.

<sup>8</sup> Much has been made of the differences between the Spanish and Portuguese colonization of Central and South America and the colonization of North America as long-term determinants of economic patterns (Stein and Stein 1970, Furtado 1971). The Spanish and Portuguese aim was almost exclusively extraction of resources, whereas the colonization of North America, at least in the northern areas, created relatively self-sufficient domestic economies.



for example, supplied the Peruvian export sector. As the importance of precious metals declined in the 18th century, new agricultural exports, including Cuban tobacco and Venezuelan cacao emerged (Furtado 1976).

The achievement of political independence in the 1820s in Latin America also freed these countries from Spanish and Portuguese mercantilist trade restrictions. Independence therefore opened up the possibility of an expanded geographical distribution of exports and imports, and opened the possibility of diversification of exports. However, the centrality of the export sector to the Latin American economies was not reduced but perhaps even increased with independence (Grunwald and Musgrove 1970). First, independence left political and economic power in the hands of the primary producers--the land-owning and mining class--who were apt to favor support for the trading sectors, and who had an interest in maintaining imports of European manufactured goods. Second, the new states' source of revenue was taxes on commerce. Trade, primarily imports, was taxed, not with the aim of restricting trade flows, but to provide government revenue. Governments therefore had an interest in maximizing trade flows.

Governments also obtained foreign exchange from foreign loans, primarily for war financing, in the first years of independence. Substantial loans were also procured to finance re-establishment of the mining sector, particularly silver, to raise exports (Marichal 1989). The depression of 1825-26 in Europe, however, created the first in what has become a long series of debt crises in Latin America. The crisis ended the inflow of capital, and mine construction efforts were halted. By the 1830s some recovery was achieved in the sector but precious metals had lost their place in the commodity lottery.

Although commodity prices were not strong in the first decades of independence, new agricultural exports developed in response to growing European demand, including coffee in Brazil, Colombia, and Costa Rica, cacao in Venezuela and Ecuador, and cattle products from Argentina. Peruvian guano exports, which skyrocketed in response to demand from the modernizing European

agricultural sector after 1840, enjoyed the greatest success among the new exports. Overall export growth was not very strong, rarely surpassing population growth between 1820 and 1850 (Bulmer-Thomas 1994, Furtado 1976), but Latin American terms of trade improved as European industry improved productivity. The resulting increased import capacity ensured revenues from import duties that kept governments afloat.

By the middle of the century the internationally current ideas of free trade and laissez-faire had been generally accepted.<sup>9</sup> To what degree practice reflected pure free trade thinking is debated (Abel and Lewis 1985, Mallon 1988), but the flow of goods, capital, and labor was essentially unhindered. The countries which most consistently held to free trade policies were those favored by the "commodity lottery", including Brazil, Chile, Peru, and Cuba, that is those producing commodities in high demand in Europe and the US, and those that enjoyed transportation advantages such as Atlantic ports (Bulmer-Thomas 1994). The successful agricultural exporters were those countries which had already established a large-scale agricultural export sector (Furtado 1976).

#### Expanding World Markets: 1850-1914

The second half of the 19th century saw the fuller integration of Latin America into expanding world markets.<sup>10</sup> The rapid progress of the Industrial Revolution in Europe and North America during this period led to greater international demand for foodstuffs and industrial raw materials. Rising incomes in the industrializing countries also increased demand for luxury commodities, including sugar,

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<sup>9</sup> Economic policy was widely debated in the early years of independence, particularly the level of taxation (Love and Jacobsen 1988, Gootenberg 1989). Gootenberg provides a thorough discussion of the political debates over free trade in Peru in the early years of independence. Topik (1987) discusses the political pressures for liberalism in the case of Brazil. The link between nationalistic policies and protectionism that is assumed today was not established in this period.

<sup>10</sup> While world trade had increased at about 1% a year between 1700 and 1820, it grew at over 3% a year between 1820 and 1870, quintupling over that period. It quintupled again between 1870 and 1914 (Grunwald and Musgrove 1970).

coffee, and cacao. Falling ocean freight costs and the development of overland transportation networks made this trade expansion feasible. The Industrial Revolution created a much more specialized world economy in which Latin America became firmly established as an exporter of foodstuffs and raw materials, and an importer of European manufactured goods and capital (Furtado 1976, Bulmer-Thomas 1994).

Nineteenth-century export expansion was predominantly in agricultural products and industrial metals. Many of these new, "non-traditional" exports have become the traditional exports of today. Expanding export opportunities created by industrial and consumption demand were met by wool, meat, and grain exports from Argentina; bananas and coffee from Central America; coffee and rubber from Brazil; sugar from Cuba; and guano from Peru. New mineral exports included copper from Peru, tin from Bolivia, and nitrates from Chile. The most rapid stage of export expansion occurred between 1880 and 1910 (Furtado 1976). Chile gained a monopoly in the nitrate trade from its victory in the War of the Pacific; Cuba was increasingly integrated into the US economy with the expansion of sugar production; Brazil benefited from the spread of the coffee economy in São Paulo; and Mexico from the high demand for minerals and petroleum. The development of new exports did not mean sectoral diversification of exports, however, since new exports often displaced traditional products such as precious metals. At the end of this expansionary period, in 1913, in most Latin American countries one commodity alone accounted for over 50% of exports (Bulmer-Thomas 1994).

Expansion of agricultural exports to meet growing demand was dependent on labor and on capital for transport and infrastructure, as well as on land. Shortages of labor, particularly skilled labor, which had been a significant brake on productive activity, were reduced by the late 19th century by population growth and large-scale European immigration. In Brazil, the population increased from 10.1 million in 1872 to 17.3 million in 1900, growing at 5% per year in the state of São Paulo with an influx of European immigrants. Railways expanded from 3.4 to 21.3 thousand km<sup>2</sup> between 1880 and 1910,

allowing coffee, cacao, and rubber exports to rise dramatically.<sup>11</sup> In Argentina, which also experienced large-scale immigration, the population doubled from 3.6 to 7.2 million between 1890 and 1914. Railways were expanded from 12.7 thousand to 31.3 thousand km<sup>2</sup>, facilitating a rapid rise in cereal and frozen meat exports (Furtado 1976).<sup>12</sup>

The 19th century clearly saw large resource and land-use changes in Latin America. Expansion of exports relied heavily on agricultural expansion. Bulmer-Thomas estimates that, assuming no change in agricultural yields,

A 5% increase in agricultural exports implies a tenfold increase in land used. Even allowing for improvements in yield and the more modest rates of growth found in most countries, export-led growth—at least when based on agriculture—still implied very substantial increases in inputs of land. (1994, p. 92)

The primary study of the loss of forest in Latin America since 1850 (Houghton et al. 1991a) found that deforestation and land conversion began to accelerate in the middle of the 19th century, increasing more rapidly after 1870, just as the Industrial Revolution moved into full gear in Europe and the US. A case study of deforestation in Southeastern Brazil (Dean 1983) found that the growth of coffee plantations relied on extensive deforestation in the Rio de Janeiro and São Paulo regions. In the 1890s alone the number of coffee trees planted rose from 300 million to 650 million. Dean estimates that about 12,000 km<sup>2</sup> of primary forest were felled for coffee trees, and an additional 3,000 km<sup>2</sup> for subsistence crops for workers in the coffee plantations. Over the course of the 19th century about 30,000 km<sup>2</sup> were cleared. Coffee expansion continued through the 1930s, supported by the expanding railway system<sup>13</sup>, domestic price support efforts, and international markets.

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<sup>11</sup> Coffee exports rose from 4 million 60-kg bags in 1880 to 10 million in 1900 to 16 million in 1914. Cacao exports rose from 6,000 to 40,000 tons between 1880 and 1914, while rubber exports grew from 7,000 to 40,000 tons (Furtado 1976).

<sup>12</sup> Cereal exports rose from 1 million tons to over 5 million tons and frozen meat exports from 27,000 to 376,000 tons between 1890 and 1914 (Furtado 1976).

<sup>13</sup> Railroad building not only facilitated transport of agricultural products and timber but also itself consumed considerable timber resources (Dean 1983).

Productivity gains in export agriculture did not often lead to great improvements in domestic-use agriculture. Domestic-use agriculture simply kept pace with demand. For overall economic growth, however, such transfers from the export to the domestic sector were essential, since at least half of the economically active population was generally employed in domestic-use agriculture (Bulmer-Thomas 1994). In those countries where agricultural exports were also domestic staples, such as wheat in Argentina, overall productivity gains were seen.<sup>14</sup> Domestic-use agriculture also benefited to an extent from improvements in infrastructure and financing associated with export agriculture. However, domestic-use agriculture was often pushed out or onto marginal lands by export agriculture, as in Central America and the Caribbean.<sup>15</sup> On the whole, domestic-use agriculture productivity lagged behind export agriculture productivity. In the 20th century, the development of a labor surplus further reduced the incentives to raise productivity and increased the use of marginal lands for domestic agriculture.

Favorable land-population ratios disguise the difficulty of access to land in much of the region. One of the largest obstacles to agricultural development was natural--difficult terrain and lack of transport infrastructure which made access to, and export from, many areas difficult even after the construction of railways. Peru's railways, for example, still have not succeeded in incorporating the economic hinterland; Argentina's railways on the other hand were quite successful in promoting commerce (Hunt 1985). The other large obstacle to land access was social and political. The land tenure system concentrated landholdings in the hands of a very few. The political power of landholders throughout Latin American's history has, for the most part, prevented any real redistribution of land assets. Agriculture, and export agriculture in particular, were dominated by large estates. Yet in many

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<sup>14</sup> In 1913, net output per worker in Argentina was six times higher than in Brazil, and four times higher than in Mexico. Statistics on land productivity are similar. Chile doubled yields in all its major crops in the forty years before World War I (Bulmer-Thomas 1994).

<sup>15</sup> In Puerto Rico, land for domestic-use agriculture fell from 71.1% of agricultural land to 31.6%, displaced by coffee, tobacco, and sugar for export between 1830 and the end of the century (Bulmer-Thomas 1994).

export crops--coffee, tobacco, cacao, wheat--there were no clear economies of scale. Large estates had an advantage in flexibility, however, since they often held much of their land in fallow, which allowed for rapid expansion of production in times of better prices (Bulmer-Thomas 1994). Domestic production was pushed to marginal and frontier lands by such expansion.

### Capital Inflows

Foreign direct investments and loans in the late 19th century reduced capital shortages (both monetary and physical). While capital requirements in mining were greater than those in agriculture, agricultural exports were facilitated by investments in essential infrastructure, primarily transportation.<sup>16</sup> Liberal economic policies facilitated foreign capital inflows and generally accepted foreign investment (Bulmer-Thomas 1994), although serious efforts were made to retain profits domestically. FDI was concentrated in a small number of sectors, notably railways, nitrates in Peru and Bolivia, sugar in Cuba, and bananas in Central America (Marichal 1989, Grunwald and Musgrove 1970). Both domestic capital and FDI tended to reinforce existing export specialization patterns and discourage diversification of production (Bulmer-Thomas 1994)--they tended to lock in existing "comparative advantage". Even when commodity prices changed, preexisting infrastructures favored areas linked to the export sector and reduced the likelihood that resources would be transferred to other sectors (Cortés Conde and Hunt 1985) once a regional comparative advantage had been constructed. The response to falling prices was therefore likely to be increased production and resource exploitation in an effort to maintain export earnings with traditional products, or a shift to new products making use of existing infrastructure.

Capital inflows surged in the late 1860s and early 1870s and again in the 1880s. Foreign capital became widely available when expansionary periods in Europe allowed for capital accumulation. Loans during the 19th century were widely used for infrastructure construction to facilitate extraction and

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<sup>16</sup> In Latin America, as elsewhere, the 19th century was the era of rapid expansion of railways.

export of natural resources (Marichal 1989). Both loan booms were followed by a collapse in capital inflows, falling trade receipts, and defaults throughout the region. The crash of 1873 introduced a long period of depression, contraction of international markets, and falling government revenues. Peru, which had borrowed heavily on the prospects of guano and nitrate exports, was hit worst by the crash. In the late 1880s, loans and direct investment were concentrated in Argentina.<sup>17</sup> The Baring panic of 1890 was essentially an Anglo-Argentine problem<sup>18</sup> and, unlike the 1873 crash, did not usher in a depression. However, the panic did considerably reduce the inflow of loans to the whole region. These recurrent crises clearly increased the need to expand exports both to finance debt and to reduce the need for borrowing.

#### Pressures to Trade

The expansion of agricultural exports depended not only on the availability of land, labor, and capital but also on the profitability of exports, which was closely tied to fiscal, monetary, and exchange-rate policies, and to international prices. On the fiscal side, government budgets depended largely on import taxes and, to a much lesser extent, on export duties.<sup>19</sup> Import duties sometimes ran as high as 100%, though tariffs on goods required by the export sector were held low (Bulmer-Thomas 1994). When World War I began, all Latin American governments were collecting at least half of their revenue from customs duties, and many were even more dependent on trade for revenue. Import levels and

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<sup>17</sup> Argentina used loans primarily for infrastructure projects, railways and ports, while other countries borrowed to finance old loans (Marichal 1989).

<sup>18</sup> The consequences for Argentina described by Marichal (1989) parallel the consequences of the most recent debt crisis: unpopular austerity programs, falling real wages, sale of state enterprises, and a net outflow of capital for debt payments exceeding 80% of the export surplus.

<sup>19</sup> Much higher duties were collected on mineral exports than agricultural exports. Chilean nitrates, for example, contributed 50% of public revenue 1890-1914; the duty was equal to 10% of the value of exports (Bulmer-Thomas 1994).

import duties were dependent on exports and capital inflows. Therefore, revenues moved up and down with trade<sup>20</sup>; trade growth was cyclical and, on average, not very strong. Government revenues per capita remained low. Efforts to stabilize balance of payments by reducing imports only led to fiscal imbalance and inflationary pressure. Governments often had little choice but to wait for changes in international prices and increased demand for exports to restore balance (Cortés Conde 1992).

On the exchange rate side, currency depreciation was frequent, especially following the US and German adoption of the gold standard<sup>21</sup>, which benefited exports but raised the price of imports and the foreign debt (Cortés Conde 1992). By the end of the 19th century, most countries began making efforts to stabilize their currencies. This period coincided with the fastest expansion of exports. Currency stabilization probably eliminated some of the uncertainty associated with export markets and encouraged more long-term investment.<sup>22</sup> However, fixed exchange rates create a rigidity that responds poorly to debt problems and fluctuations in commodity prices, and are therefore problematic for countries highly dependent on capital inflows and exports of a few commodities.

### The Commodity Trap

Latin America's terms of trade constantly fluctuated from 1850 to 1913, reflecting changes in both commodity and import prices, but no clear trend emerges. If we assume that falls in commodity prices generally reflected changes in international markets, whereas falls in manufactured product prices,

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<sup>20</sup> Because customs duties were generally specific, revenues followed trade volumes rather than price changes (Bulmer-Thomas 1994).

<sup>21</sup> Adoption of the gold standard led to a collapse in the gold price of silver, Latin America's main asset (Bulmer-Thomas 1994). Furtado points out that Latin America was an anomaly in the late 19th century international monetary system because it did not adopt the fixed rates of the gold standard. This allowed for flexibility in the face of unstable export earnings (1976).

<sup>22</sup> Moreover, the adoption of the gold standard and currency convertibility facilitated trade by eliminating the need for Latin American countries to balance trade bilaterally.



i.e. import prices, generally reflected improvements in productivity (Bulmer-Thomas 1994), then the position of commodities appears very unfavorable. High concentrations of exports--in terms of the small number of both commodities and markets--left countries very vulnerable to cycles in the relevant commodity markets. Commodities face the particular problem of low supply elasticities and low demand elasticities in the short term. Furtado and Kindleberger suggest that, even with falling prices, supply may expand. Much of the history of the period is in fact a history of booms and collapses in commodities. Guano provides the most dramatic example, but nitrates, copper, rubber, bananas, coffee, cotton, and sugar also showed periods of spectacular growth and often of rapid decline. Fluctuations in commodity prices eventually led to efforts to control markets, such as the Brazilian coffee valorization scheme (Furtado 1971, Fritsch 1988). Not all collapses in commodity exports were due to economic cycles. Even in this early period some problems were clearly environmental. Coffee production in Costa Rica, El Salvador, Guatemala, Haiti, and Venezuela, as well as cacao in the Dominican Republic, Ecuador, and Venezuela, were set back by exhaustion of suitable soils (Bulmer-Thomas 1994).

Additional obstacles to export-led growth included cyclical patterns in international trade and exogenous shocks. The greatest shocks, prior to World War I, were the British depression (1873-1888) and the Baring crisis<sup>23</sup>, in addition to several regional wars. Moreover, the fact that several Latin American countries had already achieved the dominant position in particular export sectors precluded growth through increase in market share. On the eve of World War I, Brazil had captured 70% of the world coffee market; Bolivia 20% of tin exports; Ecuador 15% of cacao exports (Bulmer-Thomas 1994); and Latin America as a region boasted 17.9% of world cereal exports, 62.1% of coffee, cacao, and tea; 37.6% of sugar; 14.2% of fruits and vegetables; 6.3% of vegetable fibers; and 25% of rubber, furs, hides, and leathers (Furtado 1976).

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<sup>23</sup> Abel and Lewis (1985) argue that the delinkage of the Latin American economies in 1873 and 1890 was greater than that experienced in 1914 or 1929.

Despite Latin America's failure to develop a range of industry during the 19th century, and her continuing reliance on primary product exports, the policies of laissez-faire and free trade were not generally questioned. In a region with very low population density, a Ricardian comparative advantage in land and natural resources seemed obvious. Resources which had remained unexploited for lack of markets, transport, labor, or capital seemed to offer endless opportunities for growth (Cortés Conde 1992). Export-led growth was expected to result from exploitation of that comparative advantage. While it has been argued that "Laissez faire tenets were honored more in the breach than in the observance" (Abel and Lewis 1985, p.180, see also Mallon 1988), trade policy was liberal in comparison to both earlier and later periods, and trade openness was high.<sup>24</sup>

#### Export-led Growth and Development

The experience of the late 19th century seemed to confirm the validity of the export-led growth model. Economic growth and expansion clearly occurred. However, growth did not reduce internal inequalities, nor create industrial societies, nor reduce the role of primary commodities in the economy. Only in retrospect has the dependency on export of commodities and openness to foreign investment and control been blamed for Latin America's underdevelopment. Much modern theorizing<sup>25</sup> about the causes of underdevelopment in Latin America is based on varying interpretations of the economic results of this period of generally free trade, and of later periods of relative isolation.

Interpretation of 19th-century Latin American economies is based primarily on the differentiation among export sectors, distinguishing those which created backward and forward

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<sup>24</sup> "The foreign trade model based on comparative advantage may have been the most durable aspect of liberalism at the ideological level...many parts of Latin America were profoundly and positively affected by Ricardian prescriptions of export-driven growth..."(Love and Jacobsen 1988, p.22)

<sup>25</sup> These theories are discussed here because of their relevance to the time period, though they were not put forth until the 20th century.

linkages<sup>26</sup> within the domestic economy, creating domestic growth, from those which functioned largely in isolation, providing no stimulus to development. The degree to which control of exports was held domestically or by foreign interests has also been at the heart of these discussions, as a key to explaining the ability or inability to retain the earnings from exports domestically. Those exports which required substantial local inputs or local processing were more likely to support domestic economic development and diversification. Two often-repeated examples are Peruvian guano, which required little more than a man with a shovel in the way of inputs, and Argentinean beef, which required efficient transport infrastructure, providing very different opportunities for economic growth.

Furtado's analysis (1976) of the expansion of Latin American exports in the 19th century is a rather simplistic model of this type but it provides a basic understanding of the approach. His analysis is based on the types of primary product the countries exported: temperate agricultural products, tropical agricultural products, and mineral products. Those countries in the first group, primarily Argentina and Uruguay, competed with domestic production in the industrializing countries on the basis of extensive use of good agricultural land. In many ways these countries were a frontier of the European economy. Because European crops were being grown, technology could be transferred directly from Europe and European experience be used to develop local technologies. These countries saw high rates of growth associated with trade expansion.

Those countries producing tropical exports, primarily Brazil, Colombia, and Ecuador, as well as Central America and the Caribbean, were competing with other tropical areas and in some cases with the slave-holding states of the Southern US. Rapid expansion of demand for coffee and cacao gave tropical commodities a dynamic role in international trade in the 19th century. But tropical commodities did not make much contribution to domestic economic development except through opening up the

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<sup>26</sup> The concept of linkages was developed by Hirschman (see Hirschman (1984) for a history of the concept), initially to explain industrial development, but was expanded to explain the varied success of primary commodity exports as an engine of growth. In this form it is related to staple theory.

agricultural frontier. Furtado attributes this failure to the fact that prices were influenced by low wages and the fact that these commodities required little in the way of infrastructure creation. There was little incentive to increase productivity through new agricultural techniques. The few exceptions include the development of coffee in São Paulo, where the large area cultivated and the high productivity levels<sup>27</sup> led to domestic market expansion.

Those countries specializing in mineral exports, notably Chile, Mexico, Peru, Bolivia, and Venezuela (petroleum), enjoyed a rapidly expanding demand for their exports because of the industrial and transport revolution. Small-scale mining was largely replaced by large-scale production funded by foreign capital. But, Furtado (1976) asserts, the mining industries remained separate from the national economies to a large extent, and therefore provided little stimulus to domestic growth. Even the associated transport investments were highly specialized and so did not contribute to the domestic economy. Mineral exploitation contributed to the domestic economy only in so far as state intervention could capture surpluses, through direct ownership, taxation, or royalties, and use them to catalyze growth.

### Outflows of Resources

The possibility that some countries were unable to capture any of the benefits from their export sectors, that the export sector acted as an enclave, was introduced by Levin (1960).<sup>28</sup> He offered the Peruvian guano sector as a classic example of an enclave export sector that existed independent of the domestic economy and, despite large earnings, offered no stimulus to the domestic economy. The extent to which enclave economies in fact existed has since been widely debated. Even easily extracted natural-

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<sup>27</sup> At the end of the 19th century, São Paulo was providing two-thirds of the world's coffee.

<sup>28</sup> This idea is also found in Hans Singer's model of the dualistic economy.

resource products such as guano offered an opportunity for governments to capture earnings<sup>29</sup> and to stimulate the domestic economy through redistribution of resources. In the case of guano it appears that the government was able to capture substantial revenue, but did not choose its investments wisely. Resources which are prone to development as enclaves, and only offer an *opportunity* for the government to create linkages with the rest of the economy, do differ from resources which *require* backward and forward linkages within the economy. The first requires active government participation while the latter does not. Interestingly, the creation of backward and forward linkages may have its own disadvantages. Investments in infrastructure for example may discourage diversification away from a traditional export sector even when prices are falling (Cortés Conde and Hunt 1985).

The enclave concept is closely tied with concerns about foreign control and ownership of Latin America's exportable resources. The degree of domestic versus foreign control is relevant to the return and reinvestment of export profits in the economy (Bertram and Thorp 1978). The theoretical rationale for this concern was raised largely by the dependency school beginning in the 1960s, although nationalist feelings appeared in policy-making in the early part of the 20th century and early charges that the 19th century was a period of British business imperialism in Latin America appeared in the 1950s (Gallagher and Robinson 1953). The all-out liberalism of the 19th century can then be blamed in part for facilitating imperialist control of resources that perpetuated underdevelopment.<sup>30</sup> Much effort has since been devoted to examining the extent of liberalism and the degree to which foreign capitalists were able to control export sectors and extract profits, with varying results.<sup>31</sup> The point remains, however, that the

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<sup>29</sup> Guano, for example, was operated essentially as a concession for which the Peruvian government charged substantial fees (Hunt 1985).

<sup>30</sup> Free trade has also been blamed for destroying early artisanal manufacturing in the Latin American countries, increasing their reliance on trade, although the viability of this sector under more favorable circumstances is uncertain (Platt 1977).

<sup>31</sup> In series of case studies, refuting many dependency assertions of foreign imperialism in 19th century trade, Platt (1977) finds little evidence of a particularly high level of control or profit extraction by British businesses in the region, but these results have been highly contested. See Abel and Lewis (1985) for historical explorations of

demand driving resource extraction and agricultural production was located in the industrial countries. Terms of trade were set by foreign demand for resources and, perhaps to a lesser extent, by Latin American needs for imports for development.

Another approach to the problem of foreign extraction of the benefits of resource exploitation has looked at the returned value (Bertram and Thorp 1978), examining how much of the profit from resource extraction was returned in some form to the domestic economy. Even in cases where the returned value level was high, however, diversification away from primary products was generally not achieved. For example, in both the Peruvian guano sector and Chilean nitrates, returned value was high but did not spark general economic expansion. In the guano case, Gootenberg (1989) suggests that while profits were captured by the state, this led not to domestic economic development but rather to a heavy dependency of the elite classes on state money, and dependency of the state in turn on foreign sales of guano. The high levels of foreign debt contracted by the Peruvian government on the basis of future profits from resource extraction provide evidence (Marichal 1989). The existence of a dual domestic economy, consisting of a narrow upper class and a huge lower class, permitted this development, and was in turn reinforced by the flow of funds from the guano sector to the state and upper class. Undoubtedly Latin America has optimized neither the total nor retained surpluses from export activities, though countries attempted to address this problem through associations, nationalizations, price controls, and various other market interventions in later years.

Dependency theory has focused on the relations of Latin America as the periphery to the industrialized countries as the center of the international economy (Cardoso and Faletto 1979). The dependency school sees structural obstacles to development inherent in the unequal relationship between

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the relationship in Latin America and a review of theoretical approaches.

The case studies (Platt 1977) find that, given the high risk involved in exporting from and investing in Latin America, the terms offered by British entrepreneurs were reasonable. Moreover, levels of British direct investment and control were no higher than reasonable business practice suggests. Imbalance must be seen, however, in the fact that investment flows were generally controlled by the British.

the periphery and the center that have substantial impact, even without reinforcement from direct business or foreign-policy intervention. Unequal relations with the industrialized countries condemn Latin America to underdevelopment and promote accumulation of capital in the center. Frank (1969) goes a step further and asserts that growth of export sectors not only did not spark growth of domestic economies but actually stifled such growth, creating underdevelopment rather than development. The accumulation of capital in the center was the result of outflow of resources from the periphery.

The response that both center and periphery countries were subject to the same market (Platt 1977) fails to address the fact that the market was created largely by demand in the industrializing countries for particular, and varying, raw materials. Arguing for the benefits of export-led growth, Cortés Conde (1992) points to the abundance of natural resources, exchangeable for capital, which was in short supply. Trade thus gave a value to Latin American natural resources that they otherwise lacked. That is, the foreign exchange value of resources was not related to their domestic value. Going beyond the fact that 19th century ideas of comparative advantage "confirmed and reinforced all the tendencies towards the development of economies dangerously dependent on the export of a limited range of primary products, at the expense of a broader, more balanced, and self-sufficient growth"(Platt 1977, p.13), we can see that the market also confirmed and reinforced the development of economies dependent on increasing extraction of natural resources unrelated to domestic needs or environmental capacity.

### Forces Shaping Resource Use

In looking at the use of resources in the 19th century, the structuralist view that the options for development open to Latin America were in large part defined by the needs of the developed countries is the most relevant. While the ecological characteristics of each country restrict the range of export possibilities, the needs of Europe and the US were necessarily the deciding factor in development of export sectors. Whether the sector was controlled domestically or by foreign entrepreneurs is not

irrelevant, since the differentiation may have had significant effects on the scale of reinvestment that occurred and it clearly shaped patterns of natural resource exploitation.<sup>32</sup> As long as the export sector remained at the heart of these economies, export possibilities would define resource exploitation. However, without foreign capital investment, the possibilities for resource exploitation, frontier expansion, and technology transfer would have been greatly reduced (Sanderson 1992). Sunkel claims that,

The history of Latin America is of course to a large extent a succession of interventions of extra-regional societies in search of appropriation of natural (and human) economically exploitable resources in order to obtain products to satisfy their own demands and accumulate a financial surplus, and the corresponding reactions of the Latin American societies. (1980, p.21)

This heuristic interpretation points to the centrality of external decision-making about resource use. Sunkel adds that how well a country manages this relationship determines how much of the surplus it retains.

While governments held to the export-led growth model, little attention was given to promoting linkages between the export sectors and the domestic economies (Bulmer-Thomas 1994). Export growth was generally assumed to be the same as export-led growth, a policy error that risks being committed today. Yet, even given sufficient linkages and overlooking the weight of the industrial countries in the market, export growth needed to be very rapid in order to serve as an engine of growth for the whole economy. Bulmer-Thomas (1994) concludes that, despite expansion of exports throughout the period, export growth was rarely sufficient to create substantial growth in the domestic economies. According to his calculations, only in Argentina and Chile was export expansion sufficient to support growth of the economy as a whole.

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<sup>32</sup> Albert cites José Carlos Mariátegui, "The best lands of the coastal valleys [of Peru] are planted with cotton and sugar cane, not because they are suited to these crops, but because only these crops are important at the present moment [ca. 1925] to English and American businessmen." (1985, p.231)



The need for diversification of exports, at least in retrospect, seems clear. There was also a need for diversification of markets, especially as technological and structural change in the industrialized countries was reducing the income elasticity of demand for raw materials.

The worst situation was clearly one in which exports were concentrated in a single product and single market and in which the productivity of the non-export sector was unaffected by export growth. Under such circumstances export-led growth was almost certain to be a failure...such cases were found all too often in Latin America, even during the so-called golden age of export-led growth.(Bulmer-Thomas 1994, p.57)

While Great Britain was the main export market for Latin America in 1850, the US had become the main market by 1913. Four countries--the US, Great Britain, France, and Germany--however, accounted for most exports.<sup>33</sup> Profound dependence on a few markets meant that Latin America was very vulnerable to fluctuations in those markets, as the crises of the early 20th century revealed.

#### Shocks to the Export-led Model: 1914-1945

Integration into world markets inevitably meant that Latin American economies were increasingly affected by the ups and downs of the European and US economies. The series of shocks in the early 20th century--World Wars I and II, the Great Depression, as well as several smaller shocks--changed liberal trade patterns *de facto*. Trade policy reorientation, and its theoretical underpinnings, appeared *de jure* only after World War II. Although the mechanisms differed, one of the primary effects of these shocks was a reduction in the availability of imports. The roots of later inward-looking economic development policies have been traced to World War I, which interrupted established trade patterns and made it very difficult to obtain manufactured imports. The forced reduction in imports led to the development of domestic import substitutes, primarily in industry but also in agriculture. The Depression was an exaggeration of the same phenomenon. World War II provided further confirmation

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<sup>33</sup> The geographical concentration of imports was less intense because of heavy competition among industrialized countries (Bulmer-Thomas 1994).

of the growing belief that inward-looking policies, including import substitution, protectionism, and financing for industrial development, were the key to development (Alexander 1994, Thorp 1992).

### World War I and the 1920s

Before World War I, international trade was essentially unrestricted, reflecting British trading interests. The gold standard provided a functional if not perfect mechanism for facilitating trade and ensuring balance of payments adjustments. This international order collapsed with World War I when the gold standard and currency convertibility were suspended by the warring countries. Supply and demand patterns were transformed by wartime needs, with policy rather than markets driving demand. Commodity markets were severely disrupted, with a short-run fall in demand for Latin American exports, a collapse in Latin American imports and, consequently, a collapse in government revenues.<sup>34</sup> Availability of imports was restricted throughout World War I. Exports, however, recovered with the long-run increase in demand for raw materials for the war effort and increases in US FDI. Oil, copper, and nitrates saw sharp price increases, but non-strategic exports did not fare as well. The collapse of European markets accelerated the shift in Latin American exports to the US market.

The 1920s saw further shifts in commodities markets, with increases in commodity prices but also increases in earnings instability, marked initially by the 1920-21 world recession. Although the recession was short-lived, growth in demand for commodities was beginning to slow over the long-run for a variety of reasons, including slowing population growth in the industrial countries, Engle's law<sup>35</sup>, expansion of new producers, and the development of synthetic substitutes for many products (Bulmer-Thomas 1994). As demand expansion was slowing, world supply was increasing because of

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<sup>34</sup> Chilean government revenue, for example, fell by two-thirds between 1911 and 1915 (Bulmer-Thomas 1994).

<sup>35</sup> Engle's law states that as household income rises the proportion of income spent on foodstuffs falls. This explains the slow increase in demand for some agricultural exports.

improvements in infrastructure and productivity and because of European agricultural protection measures and trade preferences for former colonies. As a result, Latin America terms of trade deteriorated between 1913 and 1929. But rather than diversifying away from primary product exports, dependence on these exports was even increased in some countries (Bulmer-Thomas 1994). Fundamental market problems were disguised in part by the continuing demand for strategic raw materials in the immediate post-war period, by the success in manipulating some market prices, particularly coffee, and by short-run price instability. Yet only three of Latin America's twenty-two main commodities--oil, cacao, and rubber--achieved volume increases above 5% per year between 1913 and 1928 (Bulmer-Thomas 1994). Market shifts and disease played an important role. Wild rubber exports from Bolivia and Brazil faced severe competition from Far East plantations. Exports of cacao from Brazil, Ecuador, and Venezuela were displaced by African production. Disease destroyed cacao crops in Ecuador and banana crops in Costa Rica. Chilean nitrate exports were almost completely displaced by synthetics.

### Capital Inflows

Economic policy remained tied to the export-led growth model through this period, despite Northern agricultural protection, economic recession, and trade contraction. The economies of Latin America largely followed the cycles of the export sector. Government revenue depended on import levels, which in turn depended on export levels. Changes in the value of exports likewise were highly correlated with changes in the money supply. Balance of payments problems arose from instability in international commodity markets, not from domestic imbalances. Adjustment was generally achieved by reducing imports, and thus overall economic activity.<sup>36</sup> Capital inflows remained a key feature of the

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<sup>36</sup> The gold standard was perhaps particularly unsuited for countries with exports subject to large price swings because it forced adjustment on the import side (Furtado 1976, Bulmer-Thomas 1994).

development model. A large inflow of European capital in the years before World War I, invested in railways, mines, and agricultural companies, was halted by the war. The trade surplus maintained by Latin America through the war years allowed debt service to be repaid without the benefit of new inflows. Few defaults were registered, despite the fact that Latin America became a net exporter of capital (Marichal 1989).

The crash of 1921, however, reduced Latin American exports without reducing imports, and the region turned to the US to refinance its loans. The US had emerged from the war as the new economic power and eventually became the main source of capital as well as trade partner for Latin America. The mid-1920s saw very large inflows of US capital ("the dance of the millions", 1925-28), particularly to the larger countries, far beyond their capacity for absorption, as the US sought an outlet for its accumulating capital.

Efforts to institute conservative financial and fiscal reforms<sup>37</sup>, including the implementation of fixed exchange rates to reduce the instability associated with dependence on commodity markets, were made in Latin America in the 1920s. By 1929 all countries had stabilized rates in relation to the US dollar, supported by financial reform. Fiscal reform efforts were less successful<sup>38</sup>, and trade taxes (table 4.1) still accounted for a very large share of revenue, not much reduced from 1913 levels (Bulmer-Thomas 1994). Trade taxes remained particularly important because they could be paid in gold and therefore could be used for debt-service, just as foreign exchange earnings are essential today for debt service. Thus at the end of the 1920s, Latin American economies remained very open and exports

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<sup>37</sup> Orthodox reform efforts were often prompted and guided by the missions of Kemmerer from the US. Eichengreen argues that acceptance of these missions was not a response to financial crisis but to fear of inflation and depreciation, given the late 19th century experience with these problems.

<sup>38</sup> Fiscal reforms were precluded by the political and practical difficulty of imposing direct taxes--income, property, or sales taxes--and by rising external debt levels. Moreover, the inflow of foreign capital further discouraged fiscal reforms since these funds could be used to finance government budget deficits without risking inflation.

Table 4.1  
Major Latin American Economies:  
Trade Taxes as Percent of Total Tax Revenue

<u>Year</u>	1925	1929	1939	1945	1950
Argentina					
On Imports	47.0	47.1	24.9	6.9	2.9
On Exports	7.4	2.5	0.0	0.0	0.0
Brazil					
On Imports	23.4	23.0	13.2	5.8	4.2
On Exports	7.1	10.7	2.4	0.6	0.9
Colombia					
On Imports	44.9	44.0	33.6	19.3	15.5
On Exports	1.8	2.0	4.6	6.0	4.0
Chile					
On Imports	18.0	36.8	34.3	17.9	20.4
On Exports	50.7	27.2	0.0	0.0	0.0
Mexico					
On Imports	23.2	26.1	20.1	11.6	12.5
On Exports	5.4	3.7	13.5	15.7	14.6

Source: Thorp 1992

Table 4.2  
Trade Ratios (1970 prices)

<u>Year</u>	<u>Exports/GDP</u>		<u>(Exports+Imports)/GDP</u>	
	1928	1938	1928	1938
Argentina	22.0	11.6	44.0	26.3
Brazil	14.1	17.6	32.1	27.6
Chile	31.3	29.1	51.1	40.0
Colombia	13.9	13.5	35.1	24.3
Mexico	22.3	9.9	33.9	18.1

Source: Thorp 1992

continued to account for a large share of measured GDP (table 4.2).<sup>39</sup> Virtually all export earnings were from primary products and 70% of all trade was with the US, Great Britain, France, and Germany, little changed from the pre-World War I pattern.

The Latin American downturn began in 1928 as capital inflows were diverted to speculation on the New York Stock Exchange (Marichal 1989). The economic boom preceding the 1929 crash raised world interest rates, thus reducing demand for primary products and inducing capital flight from Latin America. Export prices passed their peak before the market crash of October 1929 as supply rose faster than demand. Brazilian coffee prices peaked in March 1929; Cuban sugar in March 1928; and Argentinean wheat in May 1927 (Bulmer-Thomas 1994). Moreover, US and European protectionism constrained exports of sugar, coffee, beef, wool, copper, tin, silver, and petrol, which made debt repayment more difficult. No country had managed to break the tight link between commodity exports, imports, and government revenue (table 4.1). Financial reforms of the 1920s created a rigidity (Furtado 1976) that proved problematic for some countries in the Depression (Diaz-Alejandro 1984).

### The Great Depression

The Great Depression makes a claim to be the most severe trade crisis in Latin American history. Demand fell for all types of raw materials. Both prices and volume of exports fell dramatically. Price falls included 60% declines in the real price of copper, crude oil, sugar, cotton, and cacao from the late 1920s to the low point of the Depression (Grunwald and Musgrove 1970). Chile, perhaps the worst case, saw a fall of 85% in trade by value between 1920 and 1932 (Grunwald and Musgrove 1970). Terms of trade declined sharply between 1928 and 1932 for Latin America (table 4.3), as import prices fell more slowly than export prices. Government revenue could not be maintained in the face of the

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<sup>39</sup> Openness, as measured by the ratio of imports plus exports to GDP stood at 40% for Brazil and 100% for Venezuela (Bulmer-Thomas 1994). These figures provided by Bulmer-Thomas differ from Thorp (1992) presented in table 4.2, but reveal the same trend.

Table 4.3  
External Trade Indices for Latin America  
 (1929=100)

<u>Year</u>	<u>Export Volume</u>	<u>Terms of Trade</u>	<u>Import Capacity</u>
1925	78	104	81
1926	81	98	80
1927	91	104	95
1928	94	106	101
1929	100	100	100
1930	83	82	69
1931	90	67	61
1932	75	72	55
1933	78	74	58
1934	79	93	73
1935	86	87	75
1936	83	96	80
1937	92	103	95
1938	83	86	73
1939	89	84	76
1940	79	80	64

Source: UN ECLA (1950) reprinted in Thorp (1984)

resultant collapse of imports. Moreover, while the purchasing power of exports had fallen dramatically, debt service remained unaffected<sup>40</sup>, thus increasing fiscal and balance of payments problems for those countries trying to maintain payments. Under the gold-exchange standard rules, foreign exchange reserves were drained and balance of payments deficits developed (Diaz-Alejandro 1984). When the system collapsed, defaults on accumulated debt were unavoidable (Marichal 1989).

Latin American countries took a variety of approaches to regaining internal and external equilibrium. Measures generally included exchange controls--some pegging exchange rates to the dollar or pound--, import rationing schemes, and increases in import tariffs. By the end of 1932, most countries had achieved external equilibrium, but at much lower nominal levels of imports and exports. The decrease in imports exceeded the decrease in exports, however, creating a growing balance of trade surplus (table 4.4). Latin American exports remained virtually unchanged in value 1932 to 1937, but increased in volume by almost 20%. If Argentina and Mexico are excluded, the regional average growth was much higher, reaching 53% (Bulmer-Thomas 1994).

Recovery of GDP in Latin America in the 1930s was rapid, given the severity of the shock (Thorp 1984, Diaz-Alejandro 1984). Budget deficits persisted, however. Raw materials were never to fully recover their pre-World War I growth or purchasing power because of changes in relative prices, restrictive trade measures in the industrial countries, declining growth in demand, and the opening of new producing areas. The international economy of the 1930s was very different from the pre-War economy. Protectionism increased rapidly with the US Smoot-Hawley tariff of 1930, the Ottawa Conference of 1932 that established British imperial preference, and German trade barriers. International efforts to govern several key commodities markets included agreements on tin, sugar, tea, wheat, rubber, and copper reached between 1931 and 1937 (Grunwald and Musgrove 1970). Although world trade

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<sup>40</sup> The effect is similar to that of the rise in interest rates that contributed to the 1980s debt crisis.



Table 4.4  
Latin America: Economic Indicators 1910-1938  
 (millions of US \$)

Year	Exports	Imports	Trade Balance	Terms of Trade (1963=100)
1910	1,309	1,120	189	
1911	1,317	1,225	92	
1912	1,589	1,326	263	
1913	1,489	1,427	62	
1914	1,331	974	357	
1915	1,664	906	758	
1916	1,890	1,232	658	153.2
1917	2,059	1,418	641	162.6
1918	2,413	1,648	765	135.6
1919	3,100	2,055	1,045	112.1
1920	3,491	2,942	549	104.7
1921	2,031	2,080	(49)	77.5
1922	2,108	1,649	459	88.3
1923	2,451	2,052	399	99.7
1924	2,906	2,151	755	106.1
1925	2,802	2,461	341	106.8
1926	2,670	2,363	307	100.2
1927	2,888	2,358	530	106.8
1928	3,030	2,442	588	108.8
1929	2,954	2,500	454	101.8
1930	1,993	1,827	166	84.0
1931	1,490	1,045	445	68.2
1932	1,039	631	408	74.0
1933	1,145	797	348	76.1
1934	1,676	1,048	628	94.3
1935	1,739	1,158	581	88.8
1936	1,911	1,266	645	98.1
1937	2,420	1,690	730	105.3
1938	1,834	1,518	316	88.7

Source: Stallings 1987

recovered during the 1930s, growing in dollar terms until the second US depression of 1938, trade was increasingly managed and was highly distorted by tariff and non-tariff barriers.

### Interpreting the 1930s

The standard view of the 1930s recovery holds that the forced turn inward of the Latin American economies promoted domestically based economic expansion and recovery from the Depression. There has been much discussion of the impact of these shocks, particularly the externally induced restriction on imports, on the industrial and domestic development of Latin American countries.<sup>41</sup> The period has been seen as both a precursor of later deliberate import-substitution policies and as evidence of the success of such policies in producing domestic development. A large number of factors worked in conjunction to give advantage to the domestic sector over imports, including worsening terms of trade, increasing import tariffs, non-price import rationing, and real devaluations (Diaz-Alejandro 1984, Thorp 1984). Structural change favoring manufacturing in the larger countries and domestic-use agriculture in the smaller countries was induced by changes in relative prices, fiscal and monetary policies, and the availability of complementary imports (Bulmer-Thomas 1994).

Latin American exports fared reasonably well, according to Bulmer-Thomas (1984), because of strong government commitment to promoting the traditional exports, terms of trade favorable to exports, and strong demand for several Latin American exports, notably gold, silver, tin, and copper. Bulmer-Thomas argues that the recovery of traditional exports was the main source of Latin American economic growth post-1932, though the sector did not regain its earlier share in GDP even by the end of the 1930s (table 4.2). As the Depression reached the economy through the external sector, recovery

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<sup>41</sup> To what extent the Depression created a sharp break or was part of a gradual evolution of policy is debated (Thorp 1984, Abel and Lewis 1985). Dependency literature stresses 1929 as a major turning point, whereas the trend toward government intervention and industrialization was already extant (Thorp 1984).

was also reached through the external sector--through growth in exports, debt default, reductions in profit remittances, and improvements in terms of trade, which eventually allowed imports to recover.

Diaz-Alejandro distinguishes between passive countries and reactive countries which took policy measures, including real devaluation, to counter the effects of the Depression. The reactive countries recovered more quickly. Abandoning the rigid system of fixed exchange rates and allowing a real devaluation gave a strong stimulus to both the export and import-substitute sectors (Diaz-Alejandro 1984, Thorp 1984). Brazil, for example, experienced a real devaluation of 49%. Exchange rates lowered imports (Diaz-Alejandro 1984)<sup>42</sup>, while government constraints reinforced the reduction in imports and consumption. Import-substitution industrial expansion did occur, particularly in the larger countries which had already developed some industrial enterprises. Chile, Peru, Argentina, Uruguay and, most clearly, Brazil saw industrial expansion in the 1930s (Bulmer-Thomas 1994).<sup>43</sup> Although the foundations for this structural change were laid in the 1930s, it was not until the 1940s and 1950s that industry matured to the point where it was no longer closely tied to the fortunes of the export sector (Bulmer-Thomas 1994). Then these economies moved away *de jure* from the export-led growth model. The smaller countries, however, remained wed to the export-led development model.

Both domestic manufacturing and domestic agriculture were given a boost by import compression of the 1920s and 1930s. The change in relative prices favored import substitution in agriculture as well as import substitution in industry. Large increases in productive capacity of Argentinean wheat farms were achieved and Brazil's coffee valorization scheme promoted production increases (Love and Jacobsen 1988). Domestic agricultural expansion was greatest in Central America and the Caribbean Basin, where there was little scope for manufacturing development. But domestic-use

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<sup>42</sup> Thorp (1984) argues that the devaluation was more important than tariffs and direct controls on imports in stimulating the tradeables sectors.

<sup>43</sup> ISI results depended largely on the size of domestic markets and the availability of resources and skills (Grunwald and Musgrove 1970).

agriculture also expanded in South America, supported by improvements in transportation, energy, and technology (primarily increased use of tractors). Substantial public works and road-building programs during the period<sup>44</sup>, in particular, encouraged agricultural expansion in formerly isolated areas (Díaz-Alejandro 1984).

One of the most significant changes induced by the shocks of the early 20th century, particularly the Great Depression, was the move from a *laissez-faire* outlook to active government management of economies. The collapse of the gold-standard, for example, required government intervention in exchange rates, which are an important determinant of prices and therefore of resource use in open economies. Export sector problems led to demands from primary producers and exporters for government aid in the form of credit and price supports. The beginnings of use of demand expansion--to promote industrial growth and placate domestic groups--appeared (Abel and Lewis 1985)<sup>45</sup>. Fiscal reforms were instituted in the face of budget deficits, including imposition of some direct taxes, so that government revenue was no longer so closely linked to import levels (table 4.1). Although the policy changes did not reflect a deliberate or theoretically grounded move away from liberal policies, they set much of Latin America in the direction of inward-looking development and established new patterns of policy response to international markets.

### World War II

World War II further disrupted traditional commodity and export markets. World War II was not a period of isolation, since links with the international economy remained strong (Abel and Lewis

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<sup>44</sup> Government public works programs provided employment, replaced foreign financing, and prevented severe contraction of the money supply during the Depression.

<sup>45</sup> Whether these policies were consciously pre-Keynesian is debated (Thorpe 1984, Abel and Lewis 1985).

1985), and allocation of resources was largely determined by the Allied War effort. While there was heavy demand for petroleum and minerals, Latin America lost growing markets in Europe.<sup>46</sup> Imports were scarce because of shortages of consumer goods and shipping. The conjunction of increasing nationalism and populism, often marked by a change in political regime, with the collapse of international trade further stimulated state participation and expansion in the economies of Latin America.

A collapse in Latin American exports was prevented in part by a system of inter-American cooperation, supported by the US in an effort to assure access to strategic raw materials. US official loans and FDI, primarily in strategic materials, rose rapidly.<sup>47</sup> There was also a successful effort to increase intra-Latin American trade in order to sustain exports. Export volumes suffered nevertheless. In most Latin American countries there was little or no growth in export volume between 1929 and 1950 (Grunwald and Musgrove 1970); most countries did not regain pre-1939 levels of exports until after the World War II. However, the value of exports rose rapidly (table 4.5), primarily because of wartime dollar inflation. Export prices rose by 9.8% a year between 1939 and 1945. Prices of imports rose too, as did domestic costs of living, so the value increase in exports did not support growth in consumption. Imports fell one-third by volume between 1939 and 1942 in response to rising prices and wartime shortages (Bulmer-Thomas 1994).

Every country in the region ran a trade surplus during the War, enhanced by net inflows of US funds. Thorp (1992) argues that the nature of *de facto* ISI policies was changed in World War II. During the Depression, devaluations had turned terms of trade in favor of tradeables and had limited

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<sup>46</sup> Exports to Germany, Italy, and Japan had grown during the 1930s and were cut off by the War (Bulmer-Thomas 1994).

<sup>47</sup> Inter-American cooperation extended even to US promotion of the Inter-American Coffee Convention, recognizing the importance of coffee exports to the region. Notably, this sort of "cooperation" was not extended to temperate crops competing with US production (Bulmer-Thomas 1994).

Table 4.5  
Latin America: Economic Indicators 1939-1980  
 (millions of U.S. \$)

Year	GDP	Exports	Imports	Trade Balance	Current Account	Terms of Trade (1963=100)	Exports/GDP	Exports + Imports/GDP
1939	12,202	1,719	1,370	349		86.7	14.1	25.3
1940	12,411	1,596	1,338	258		82.6	12.9	23.6
1941	14,176	1,930	1,447	483		84.0	13.6	23.8
1942	16,211	2,003	1,345	658		85.1	12.4	20.7
1943	17,912	2,558	1,520	1,038		85.2	14.3	22.8
1944	19,671	2,962	1,861	1,101		81.4	15.1	24.5
1945	20,527	3,153	2,236	917		84.3	15.4	26.3
1946	24,749	4,697	3,781	916	436	110.7	19.0	34.3
1947	29,408	6,046	6,364	(318)	(965)	119.9	20.6	42.2
1948	32,866	6,634	6,282	352	(359)	120.0	20.2	39.3
1949	33,516	5,494	5,506	(12)	(494)	112.0	16.4	32.8
1950	35,629	6,656	5,623	1,033	322	135.0	18.7	34.5
1951	40,302	7,823	8,066	(243)	(1,052)	134.0	19.4	39.4
1952	42,431	7,075	7,859	(784)	(1,311)	123.0	16.7	35.2
1953	44,770	7,609	6,755	854	85	132.0	17.0	32.1
1954	48,286	7,921	7,617	304	(384)	135.0	16.4	32.2
1955	52,127	8,065	7,748	317	(426)	125.0	15.5	30.3
1956	56,151	8,767	8,202	565	(535)	123.0	15.6	30.2
1957	61,786	9,132	9,685	(553)	(1,861)	124.0	14.8	30.5
1958	66,437	8,516	8,884	(368)	(1,231)	115.0	12.8	26.2
1959	69,295	8,414	8,279	135	(694)	107.0	12.1	24.1
1960	75,428	8,077	8,079	(2)	(1,132)	106.0	10.7	21.4
1961	81,500	7,957	8,136	(179)	(1,303)	105.0	9.8	19.7
1962	85,955	8,447	8,281	166	(1,240)	99.0	9.8	19.5
1963	90,021	8,893	8,030	863	(373)	100.0	9.9	18.8
1964	98,206	9,569	8,783	786	(699)	102.0	9.7	18.7
1965	105,569	10,058	9,028	1,030	(420)	98.0	9.5	18.1
1966	113,157	10,630	10,011	619	(1,051)	100.0	9.4	18.2
1967	121,850	10,594	10,323	271	(1,560)	97.0	8.7	17.2
1968	135,504	11,204	11,365	(161)	(2,355)	98.0	8.3	16.7
1969	152,234	12,363	12,402	(39)	(2,049)	101.0	8.1	16.3
1970	171,682	13,855	14,242	(387)	(2,726)	103.0	8.1	16.4
1971	192,499	14,103	15,896	(1,793)	(4,126)	100.2	7.3	15.6
1972	214,208	16,236	17,720	(1,484)	(4,049)	103.3	7.6	15.9
1973	245,888	23,789	23,256	533	(3,338)	116.2	9.7	19.1
1974	288,923	36,596	40,035	(3,439)	(7,474)	136.1	12.7	26.5
1975	326,671	33,406	43,368	(9,962)	(13,791)	119.6	10.2	23.5
1976	358,976	38,628	44,156	(5,528)	(11,636)	123.8	10.8	23.1
1977	397,422	46,049	50,012	(3,963)	(11,528)	131.0	11.6	24.2
1978	445,990	49,463	56,102	(6,639)	(18,436)	117.5	11.1	23.7
1979	515,969	68,126	74,272	(6,146)	(20,069)	122.7	13.2	27.6
1980	591,917	89,750	98,043	(8,293)	(27,969)	128.5	15.2	31.7

Source: Stallings 1987

imports. During World War II, exchange rates became overvalued as inflation was sparked by rising import prices, accumulation of reserves, and efforts to increase exports. This overvaluation was to become a standard feature of later *de jure* ISI policies that limited export growth. In contrast to the Depression years, when the fall in imports was partly offset by increased consumption of domestic goods, the wartime suppression of imports did not contribute substantially to import substitution in consumer goods. Some countries did manage to expand industrial output of intermediate- and capital-goods industries that relied on the state and industry for demand, rather than household consumption. Nevertheless, industrial growth exceeded agricultural growth everywhere, as agriculture performed very poorly during World War II. Agricultural exports were restricted by wartime constraints. Slow growth in domestic consumption restricted growth of domestic agriculture (Bulmer-Thomas 1994). Mexico alone showed significant growth in agriculture, as the results of the land reforms of the 1930s appeared.

Increasing government intervention was inevitable in this period to deal with inflation and new state responsibilities. Government spending increases included military spending, social spending--required by the changing political temper of the times--and spending for infrastructure to support increases in domestic supply. Fiscal deficits continued both because of increasing government expenditures and because of falling revenues from import tariffs. Import taxes still accounted for 25% of revenue in the larger countries, though they fell to about 10% in Argentina, Brazil, and Mexico by the end of World War II, and to about 50% in many of the smaller countries (Bulmer-Thomas 1994, also table 4.1).

The end of World War II saw an increase in consumer goods, a fall in fiscal deficits, and a fall in inflation. Inflation, however, was to prove difficult to contain in Latin America, and in a number of countries--Argentina, Brazil, Chile, Colombia, Uruguay--continued for decades (table 4.6). New problems were created for Latin American trade as the US abandoned its wartime policies of cooperation. Both trade with the US and regional trade fell. The volume of exports grew only slowly in

Table 4.6  
Inflation Rates for Consumer Prices  
(Average Annual Rates)

<u>Country</u>	<u>1950-80</u>	<u>1981-85</u>
Chile	77	22
Argentinian	63	382
Uruguay	42	46
Bolivia	34	2,692
Brazil	33	154
Paraguay	19	16
Peru	16	105
Colombia	14	22
Mexico	9	62
Ecuador	6	28
El Salvador	5	15
Costa Rica	5	37
Dominican Republic	4	17
Honduras	4	7
Guatemala	4	8
Venezuela	4	11
Panama	3	3

Source: Cardoso and Fishlow 1992



the first years after the War. However, commodity prices rose rapidly as trading conditions improved. All countries saw a rise in the price of their exports of at least 50%, some of as much as 100% (Bulmer-Thomas 1994). Since import prices did not rise so quickly, there was a sharp improvement in terms of trade that was prolonged for several years by the Korean War (1950-53). Terms of trade hit a peak for most of Latin America in the early 1950s with price increases partly compensating for the failure to increase export volumes (Bulmer-Thomas 1994, also table 4.5). Strong international reserves were used largely to renew debt repayment and to nationalize foreign-owned enterprises.

Until the debt crisis of the 1980s, the Latin American countries were able to reduce the constraints placed on economic growth by the foreign exchange gap through restrictions on imports, expansion of exports, and capital inflows. The strong recovery of growth and trade in the post-War years set the stage for large-scale changes in social and economic structures related to massive urbanization and industrialization and rising energy use. Agricultural expansion and modernization, including a shift to agri-business and industrialization of commodity production, based on both external markets and domestic demand created by ISI measures, have accelerated deforestation and frontier development, and reshaped land use in Latin America.

#### Rethinking the Virtues of Trade: 1950s-1970s

The terms of the policy debate in the post-War years had changed dramatically. Just as foreign reserves were being drawn down after the War by debt settlement and nationalizations, imports rose 75% by volume and 170% by value (1945-48) (Bulmer-Thomas 1994). The foreign exchange constraint as a determinant of growth became a primary policy focus (Cardoso and Fishlow 1992). Governments began to look to institutionalization and rationalization of import-restriction policies to slow this influx and prevent the outflow of reserves. Internal and external, intellectual and political factors combined to undermine the case for export-led growth and favor inward-looking development.

### The ISI Model

Inward-looking policies were supported intellectually by the theories of Raul Prebisch at ECLA (the UN Economic Commission on Latin America). The Prebisch thesis (1984, 1994) holds that primary commodities will face a long-term deterioration in their terms of trade because of the changing pattern of demand in industrialized countries<sup>48</sup>, where primary commodities command a smaller and smaller share of markets<sup>49</sup>, and increased competition among primary product producers (see Chapter 3). Gains in productivity in industrial products will not be passed on to developing country consumers through lower prices but rather retained by the industrial countries. In other words, there is an asymmetry in the distribution of the welfare gains from trade because of different elasticities of demand for primary and manufactured products. Given the large size of the external sector, the importance of primary commodity exports, and the dependence on imported goods and capital in Latin America, declining gains from trade could be expected to lead to serious balance of payments problems and to hamper growth.

The ECLA solution focused on import substitution for industrial expansion. In general the understanding of development that was current, and is still prevalent, saw industrialization as a key step on the road to modernization. The experience of the early decades of the 20th century seemed to provide evidence that a forced reduction in imports would spark industrial development. ECLA theory was not isolationist. Diversification of exports and continued exploitation of Latin America's comparative advantage in natural resources and labor were to support industrial development; export of resources was to pay for industrialization. The interest was in renegotiating the terms of participation in international

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<sup>48</sup> As yet there has been no proof of declining terms of trade (see Chapter 3).

<sup>49</sup> This is essentially Engle's law at the country rather than household level.

markets.<sup>50</sup> However, in practice the export sector was disadvantaged by ISI policy, in part because of the legacy of currency overvaluation remaining from World War II (Thorp 1992), in part because the reorientation of market relations had to be structured by Latin American policy.<sup>51</sup>

The inward-looking model took various forms in Latin America. The larger countries, which had already established an industrial base, adopted the new model wholeheartedly. These included Argentina, Brazil, Chile, and Uruguay. Colombia and Mexico tried to combine the inward-looking ISI model with export promotion. Restrictions on imports were effectively achieved using an array of high tariffs, import licenses, and complex exchange-rate systems. Some tariff levels were astronomical, with effective rates of protection even higher. The structure of imports was successfully shifted away from consumer goods in favor of producer goods (intermediate and capital goods). Volumes of imports peaked in Mexico in 1947, in Argentina in 1948, and Brazil and Uruguay in 1951 (Bulmer-Thomas 1994). By the early 1950s, industry had become the leading sector, or close to, in all of these countries. However, these countries faced balance of payments problems and high inflation (tables 4.5, 4.6) which did not respond to various IMF stabilization programs. Export earnings remained dependent on primary products, which fared poorly under economic policies that had a strong anti-export bias. As capital flows in the post-War years were diverted to European reconstruction, the domestic sector was limited by the lack of finance available for large-scale investment and by the lack of domestic technology (Bulmer-Thomas 1994). This need led to acceptance of MNC investment and to extensive creation of state-owned enterprises in a range of industries and in development banking. Cardoso and Fishlow (1992) argue that the "higher shadow price of foreign exchange", that is the capacity to reduce foreign

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<sup>50</sup> This idea arose too in the promotion of the New International Economic Order (NIEO) (see Fishlow et al. 1978) and of the Generalized System of Preferences (GSP) (see Abreu and Fritsch (1987). For new proposals, see Arden-Clark (1991, 1992).

<sup>51</sup> Externally induced restrictions on imports, as in the first half of the century, did not necessarily entail restrictions on exports.

exchange needs, was used to justify such investments which were often not cost effective by other measures. This is a reflection of the over-valuation of foreign exchange that has affected resources (see Chapter 3).

The smaller countries continued to rely on the traditional development model based on exports of primary products, given their weak industrial base and small domestic markets.<sup>52</sup> Imports rose along with the post-War improvements in terms of trade. Although the export sectors in these countries declined in terms of their share in world trade, because of specialization in primary commodities, the decline was not nearly so rapid as in those economies which adopted pure ISI policies. A few countries--Costa Rica, Ecuador, Nicaragua, El Salvador, and Venezuela--even saw an increase in their share of world exports between 1945 and 1960 (Bulmer-Thomas 1994). In some cases, export-led growth was based on intensified production of traditional exports, as was the case with Venezuelan oil, Bolivian tin, and Cuban sugar. Generally, export diversification was pursued as well, based on new primary products and expanded production of previously minor exports.<sup>53</sup> Peru, for example, expanded production of lead, zinc, copper, iron, and fish products. Fish products jumped from 1% of Peruvian exports in 1945 to 33% by 1970. Ecuador was able to capture 25% of the world trade in bananas, and Guatemala captured 80% of the cardamom trade. Paraguay expanded cotton and soybean production. Central America added cotton, sugar, and cattle to its traditional coffee and banana exports (Bulmer-Thomas 1994). Exports of primary products remained critical to GDP, employment, and public revenue.

Beginning in the late 1950s, terms of trade worsened for Latin America. More and more commodities were subjected to developed country restrictions or international commodity agreements, as were sugar, tin, cacao, and coffee, which constrained export growth. Foreign control of production

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<sup>52</sup> Bolivia, Paraguay, and Peru, all of which briefly experimented unsuccessfully with ISI, soon switched to outward-looking policies and export diversification strategies.

<sup>53</sup> Efforts to diversify away from primary products were rare and, with the exception of Panama's canal-based activities, generally unsuccessful (Bulmer-Thomas 1994).

was increasing, especially in minerals and the dynamic agro-export sectors (Bulmer-Thomas 1994). The appeal of the inward-looking model grew as ECLA's forecasts gained credibility. The small countries faced balance of payments problems in addition to continuing external vulnerability. Moreover, environmental constraints on the supply side were becoming apparent. Peru's fish stocks were showing serious signs of depletion by the 1970s; soil erosion in Haiti was preventing agricultural expansion. While the export-led growth model was not abandoned, countries tried to graft the ISI model onto existing policies, usually by giving special privileges to new industries and establishing development banks. ISI was to prove much less successful in these small countries since industries necessarily required imported inputs and faced the constraint of small markets. But by the "mid-1960s every Latin American republic--even those that promoted exports--included in its arsenal a formidable battery of instruments to restrict imports and encourage the import-competing sectors." (Bulmer-Thomas 1994, p.265)

#### The International System, Trade Opportunities, and Resource Use

Ironically, the end of World War II also saw the establishment of a new international economic order intended to promote world trade. The IMF, World Bank, and GATT were expected to promote international trade and development in an economic order based on the dollar and fixed exchange rates. The GATT, a limited achievement on the trade front<sup>54</sup>, did not address the issues of major concern to Latin America, namely commodity trade.<sup>55</sup> World trade began a twenty-five-year period of growth (1948-73) during which import and export values expanded by 9.7% per year, with slightly lower

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<sup>54</sup> A trade organization on the scale of the World Bank and IMF, the proposed ITO, was not established. The Uruguay Round of GATT has finally created an international trade organization, the WTO.

<sup>55</sup> Agricultural trade was not included in the GATT until the Uruguay Round of negotiations completed in 1994. See Hoekman (1995) for a summary of the new agreement. A thorough review of the implications of previous GATT agreements is found in Abreu and Fritsch (1987).

increases in volume. Most of this trade, however, was between developed countries and in manufactured goods. Primary product trade grew more slowly at 6% year (Bulmer-Thomas 1994). International trade structures were no longer defined by the exchange of primary products for manufactures.

The region's share in world exports fell steadily through this period--from 13.5% in 1946, to 10% in 1955, to 7% in 1960--as the larger countries deliberately withdrew from world markets, as commodity prices continued to fall from the end of the Korean War through the 1960s, and as the developed countries increased agricultural protection and preference schemes (figure 4.1). Latin America remained dependent on a small set of commodities in which it was able to secure only a shrinking market share. Sixteen commodities that comprised 63% of the region's exports in the 1930s comprised 70% of exports in the early 1960s (Grunwald and Musgrove 1970). Market shares were lost in coffee, oil, sugar, wheat, beef, wool, maize, and hides.<sup>56</sup>

Experiments with regional integration were tried, on the assumption that domestic industries needed access to larger markets. Although the institutions established were fairly unsuccessful--the LAFTA in 1960, the Andean Pact in 1962, and the Central American Common Market in 1960--inter-regional trade did grow in both absolute and proportional terms in the 1960s and 1970s. Moreover, manufactures came to comprise half of this trade by 1975, much in contrast with extra-regional trade, where manufactures did not figure. Inter-regional trade, however, was not a counterweight to international markets but rather moved pro-cyclically, and was even more unstable than extra-regional trade (Bulmer-Thomas 1994), so that vulnerability of trade was not reduced.

ISI did not reduce the demand for raw material extraction, nor the importance of exports for Latin America. Import-substitute industries and agriculture clearly demand their own resource inputs. They also required capital goods and energy inputs from abroad, which depended on the foreign

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<sup>56</sup> While a few small outward-oriented countries gained market shares, often at the expense of other Latin American countries, and achieved some diversification, the impact on the regional economy was small (Bulmer-Thomas 1994).

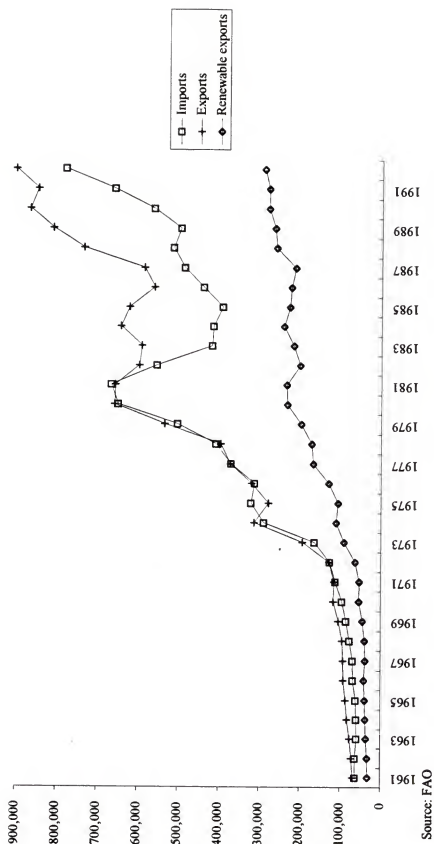


Figure 4.1  
South American Exports  
(US\$ 100,000)

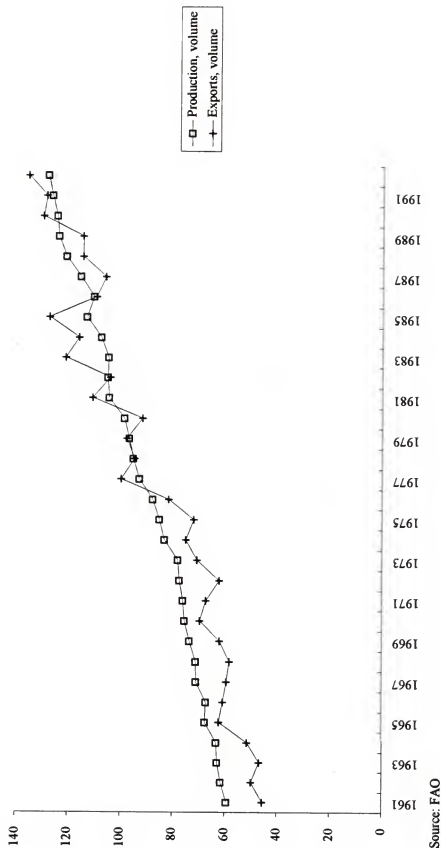


Figure 4.2  
Latin American Agricultural Indices  
(1979-81= 100)



exchange earnings of primary products. The ISI model was hampered by inherent balance of payments problems. The export sector remained largely unchanged under ISI policies for at least two reasons (figures 4.1, 4.2). First, the industries which developed in the protected ISI environment were generally too inefficient to compete on world markets, so manufactures were not added to traditional exports. Second, the primary commodity sectors received no boost from policies of the period, but rather suffered from the anti-export bias embedded in over-valued exchange rates and policies geared toward domestic protectionism.<sup>57</sup> There was no real effort to improve the efficiency of export-producing sectors or to diversify exports in most countries. New exports developed over the period--for example, bananas in Ecuador, cotton and fishmeal in Peru--were almost all primary commodities. Agricultural growth was in domestic-use agriculture (figure 4.3).

The Alliance for Progress, established in 1961 in the wake of the Cuban Revolution, increased flows of official US capital, particularly for social and economic reforms and, along with PL 480 food imports in some countries, relieved balance of payments problems. Various reform efforts were made, with little success, including efforts to move from regressive indirect taxes to direct taxes, with spending targeted to the poor. Land reform was also emphasized by the Alliance for Progress, but most efforts have not survived the long haul (Dorner 1992). One reason for the failure to implement effective land reform programs was the fear of lost export earnings. Agricultural exports came disproportionately from large landholdings. In countries where land reform did have some impact, notably Chile and Peru, exports were affected (Bulmer-Thomas 1994). Productivity of large holdings increased in the 1970s, with the help of Green Revolution technology, reducing the strength of economic arguments for land reform based on efficiency while leaving the social and environmental problems unresolved. Calls for land reform today, at least from the developed world, have been largely superseded by calls for land

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<sup>57</sup> Much has been made recently of impact in agriculture of government anti-export and domestic policies. This is described as the "plundering of agriculture" (Schiff and Valdés 1992), which liberalization is expected to reverse!

titling and clarification of property rights.<sup>58</sup> In the absence of a security threat to the US, redistribution is no longer an international priority.

### Dependency Theories

Structuralist theories in all their variety stress the critical role of the external in Latin American economies, whether it be exports providing government revenue, capital borrowed abroad, or emulation of industrial-country styles of development. Dependency theory, which reacted to the perceived failure of the 1950s approach to development, has done much to explain the failure of Latin American development efforts, though its policy ramifications have been less clear.<sup>59</sup> Dependency theorists have pointed to the role which international economic structures and foreign interests have played in the determination of resource use in Latin America, and focused on the unequal distribution of resources which has left use decisions in the hands of the few. Latin America has not managed to optimize either the total or the returned value from export activities, although it has tried various approaches from taxation to nationalization to international cartels. ISI policies failed in so far as the industrial sector that was created was capital-intensive and did not establish linkages with other sectors of the economy. The distorted patterns of industrialization that developed relied on imported technology and inputs which were paid for with traditional primary product exports, and exacerbated trade balance problems. Penetration of foreign capital in profitable economic sectors offered further evidence of the dominant role

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<sup>58</sup> One of the arguments made for improving land titling and property rights is that it will lead to more sustainable land-use practices.

<sup>59</sup> The implication of most dependency writing is that only a complete delinking from the center will permit development in the periphery. Barring the political and economic possibility of such a radical move, the second best option would appear to be more of the same inward-looking policies. The division between theorists who advocate delinking and those who find opportunities in international markets, or mutual benefit, is discussed by Hirschman (1981) and Streeten (1984).

of the countries of the center in the international economy and the impossibility of the developing countries catching up.

### The Late 1960s and 1970s: Restoring Exports

Most Latin American countries turned to export promotion in the late 1960s and early 1970s for a variety of reasons: The ISI model showed signs of stagnation and had neither reduced vulnerability to changes in export revenue nor contributed greatly to employment. Industries developed with government subsidies and under exchange-rate regimes favoring imported inputs were capital- and energy-intensive.<sup>60</sup> Balance of payments problems were constant. Positive incentives for increasing exports included new opportunities for exports based on the new division of labor which gave a competitive advantage to countries with low labor costs, the model of the successful NICs in Asia, the prospect of better terms of trade for commodities under the new GSP initiative, and the commodity price boom of the 1970s.

The Latin American countries took various approaches to export expansion. Tariff reductions and more frequent currency devaluation (crawling peg systems) were widely introduced (Cardoso and Fishlow 1992). Those countries which had been most successful under the ISI model, Brazil, Argentina, Colombia, and Mexico, simply added export promotion to that model. Export promotion among these countries was successful in raising the share of manufactures in total exports, thus reducing the vulnerability to commodity markets and reducing the geographical concentration of exports. However, the openness of these economies was not increased. The ratio of exports to GDP barely increased (table 4.5) and the fall in the share of world exports was not reversed. Increases in manufactures failed to offset the poor performance of primary products, which remained subject to an anti-export bias. Fluctuations in the real effective exchange rate, particularly policy-driven currency appreciation used in

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<sup>60</sup> This is distinct from the form of ISI that occurred in the early years of the century, when industrial development tended to be labor intensive.

part to control inflation, also plagued efforts to increase exports (Cardoso and Fishlow 1992, Bulmer-Thomas 1994).

### Responses to the Shocks of the 1970s

Latin America was vulnerable to the economic shocks of the 1970s because of the continuing reliance of the region on a few primary product exports. Beginning with the collapse of the Bretton Woods system of fixed exchange rates and followed by the two oil shocks, the 1970s saw substantial disruptions and changes in commodity and capital markets. The rapid rise in oil prices increased foreign exchange requirements for oil importers, particularly those which had established energy-intensive industrial sectors. However, strong prices for many other commodities boosted export earnings. Nevertheless, trade balances deteriorated (table 4.5). Chronic inflation was given a further stimulus. The extent of Latin America's economic vulnerability and balance of payments problems was in large part concealed by rising commodity prices, by continued growth, and by the easy availability of international loans to cover trade and fiscal imbalances.

Those small countries which had never moved far from the export-led growth model hoped to exploit improving prices for primary products in the 1970s by maintaining or increasing export levels. Oil exporters were clearly favored by the rising price of oil. The countries which were able to increase their volume of exports fared best.<sup>61</sup> New primary products were also established in this period, including natural gas from Bolivia; new oil production in Ecuador; expansion of cotton and soybeans from Paraguay; soybeans and citrus from Brazil; crude oil exports from Guatemala; and coca paste from Bolivia and Ecuador. Even if illegal exports are excluded, the export sector grew very rapidly, with the value of exports jumping between 500% and 1000% between 1970 and 1980 (Bulmer-Thomas 1994).

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<sup>61</sup> The Central American countries, for example, increased coffee exports following a frost in Brazil in 1975 and the collapse of the export-quota system of the International Coffee Agreement (Bulmer-Thomas 1994).

Several countries rejected the ISI model in favor of a neo-liberal approach. Chile, the best known case, was the first to adopt these policies, under Pinochet in 1973. Uruguay also moved in this direction in 1973, Argentina followed in 1976, and Peru, to a lesser extent, in 1978. Economic development was thought to have been seriously distorted by ISI policies and by state intervention and expansion. Liberalization of trade and capital markets and integration into world markets was expected to promote economic growth. In large part, this sharp change of policy direction reflected the relatively poor performance of the Southern Cone economies in the post-War period. Export volumes had declined and persistent balance of payments problems had fueled inflation. The experience of these countries, which have been labelled "market-authoritarian" (Sheahan 1987), is particularly interesting because of the similarity to policies being advocated today, although with a more democratic bent, with the Chilean economy offered as proof of their effectiveness.

Trade liberalization was the centerpiece of the new liberal policies<sup>62</sup>, and showed an early economic success, with exports rising faster than imports and a shift in the composition of exports toward non-trationals. Capital liberalization, part of the effort to stem inflation, however, led to a rapid increase in imports which was further promoted by overvalued exchange rates in this period of high international liquidity. When international inflows fell, drastic measures were required to protect the balance of payments. De-industrialization was widespread as imports replaced domestic production, just as the laws of comparative advantage suggest (Bulmer-Thomas 1994, Hojman 1990).

#### Capitalization of Agriculture and Urbanization

While in the 1960s and early 1970s land reform efforts dominated agricultural change, since then the greatest change has been the capitalization of agriculture (Knox and Agnew 1989). Agricultural modernization has meant a further concentration of land and agricultural capital at the expense of

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<sup>62</sup> Chile reduced tariffs to 10% by 1979, Argentina and Peru to 35% by the early 1980s (Bulmer-Thomas 1994).

Table 4.7  
Latin American Land Use Patterns  
(1000 ha)

Year	Land Area	Agricultural Area	Annual Crops	Permanent Crops	Permanent Pasture	Forests/ Woods
1961	2,017,650	607,848	86,663	15,816	505,414	1,033,209
1965	2,017,650	629,378	92,062	16,746	520,620	1,017,089
1970	2,017,650	656,914	99,054	17,805	540,055	995,636
1975	2,017,664	681,049	107,581	18,816	554,652	972,488
1980	2,017,651	704,628	117,486	21,135	566,007	946,213
1985	2,017,651	720,275	122,362	20,695	577,218	920,421
1991	2,017,651	743,579	132,544	20,767	590,268	887,570
Years	Rates of Change					
1961-1965	3.5	6.2	5.9	3.0	-1.6	
1965-1970	4.4	7.6	6.3	3.7	-2.1	
1970-1975	3.7	8.6	5.7	2.7	-2.3	
1975-1980	3.5	9.2	12.3	2.0	-2.7	
1980-1985	2.2	4.2	-2.1	2.0	-2.7	
1985-1991	3.2	8.3	0.3	2.3	-3.6	
1961-1991	22.3	52.9	31.3	16.8	-14.1	

Source: FAO

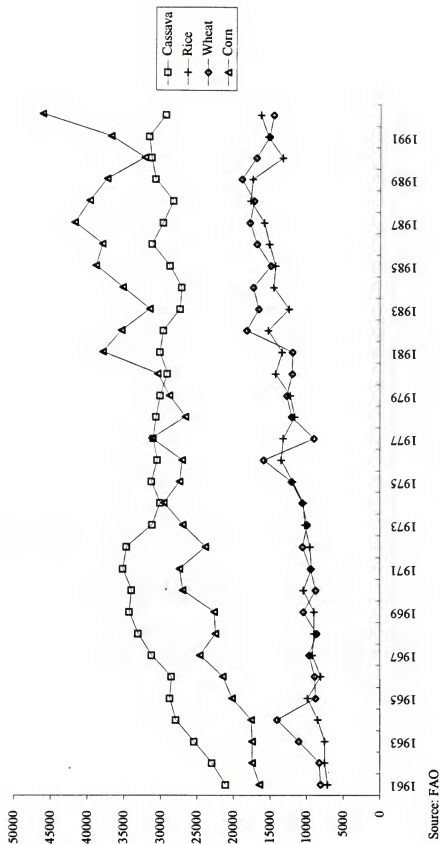


Figure 4.3  
South America:  
Production of Selected Staples (1000 MT)

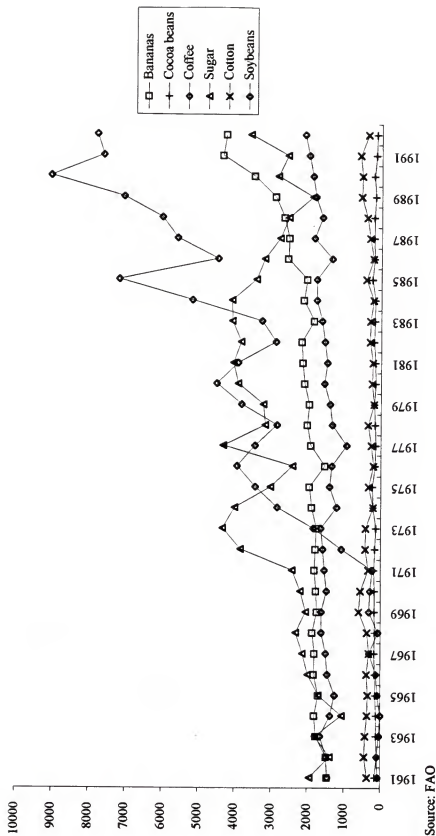


Figure 4.4  
Selected South American Exports  
Volume (1000 MT)



traditional communities. Evidence of skewed policies on credit, natural resource use, technical assistance, and land ownership in favor of the agro-industrial sector is strong (Sanderson 1992), as the Brazil case shows.

Government policies have discriminated heavily in favor of the larger landowners. The geographical distribution of official credit, research and extension, infrastructure, mechanization and Green Revolution inputs reflect the geography of landholding. (Knox and Agnew 1989, p.280)

MNC investment in agriculture has been particularly extensive in Latin America<sup>63</sup>, attracted by cheap land and labor and improved infrastructure. Between 1966 and 1978, US investment in Latin American agriculture rose from \$365 million to \$1.04 billion, concentrated in Argentina, Brazil<sup>64</sup>, Mexico, and Venezuela (Knox and Agnew 1989).

Urban growth, nationalizations, and ISI strategies led to massive movements of people off the land (Knox and Agnew 1989). Urbanization proceeded rapidly during this period, absorbing expanding populations. The share of the labor force in agriculture fell everywhere, and in Argentina, Chile, and Uruguay there was an absolute fall after 1960 (Bulmer-Thomas 1994). Industrialization, however, drew its resources and capital from the agricultural sector in the form of cheap food, raw materials, foreign exchange, and tax revenue. To support industrialization, increases in agricultural production were required, which came in the form of mechanization, capital investment, and expansion of agricultural land (table 4.7).

In the 1970s a number of tradeable crops showed spectacular growth rates (figures 4.2, 4.4) (Knox and Agnew 1989). Sorghum expanded by 125.5% annually in Brazil; 68.9% annually in Venezuela; and 20.4% annually in Colombia. Soybeans expanded by 83.3% annually in Paraguay; 63.9% annually in Argentina; and 59% annually in Brazil. Figures indicate a decline in the land area in

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<sup>63</sup> In comparison with other developing regions.

<sup>64</sup> US MNCs bought 35 million ha of agricultural land in Brazil between 1964 and 1970.

basic food crops (figure 4.3) over this same period, which was only partly compensated by increases in yields. In Chile, fruit and livestock replaced wheat and sugar beets; in Mexico and Brazil, sorghum displaced corn; and throughout the region pasture for livestock and feed production replaced basic food crops (Knox and Agnew 1989).

While the comparative advantage in export agriculture and resource exploitation stems in part from low costs in Latin America, particularly in labor, the relatively high capital intensity of export agriculture (Sanderson 1992, Sunkel 1980, Williams 1986) should, in fact, reduce that advantage. Export agricultural production has taken on many of the characteristics of industrial production, aiming at product uniformity (Redclift 1984, Sanderson 1986, Reynolds et al. 1993). Northern demand has been schooled to prefer those products which reflect high inputs, in the form of pesticides, rapid transport, and so forth. Inputs therefore raise the value of production above what the actual volume of production increase would entail.<sup>65</sup>

Domestic consumption has been characterized by sharp increases in non-traditional cereals consumption, both for food and livestock production (Barkin et al. 1991). The rise in wheat consumption reflects changing food consumption patterns that have accompanied urbanization (Barkin et al. 1991).<sup>66</sup> On the whole, imports of food increased over the 1960s and 1970s in Latin America while export production rose.

Agricultural gross product increased by 250% between 1955 and 1980 (Sunkel 1980) and by 30% since 1980 (ECLA), while rural population growth was slowing. Despite this growth there was little change in poverty, reflecting a growing income disparity between peasant and capitalist sectors

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<sup>65</sup> For example, while application of pesticides may raise actual banana production, it also will produce fruits with fewer blemishes, which can command a higher market price. Other fruits may not even be exportable.

<sup>66</sup> "These patterns of displacement of maize by sorghum, rice, and wheat cannot be explained by agronomic factors alone, but must be understood in the context of changing socioeconomic conditions in Latin American countries." (Barkin et al. 1991, p. 19)

(figures 4.3, 4.4). Links can be drawn between agricultural modernization and political instability, particularly in Central America (e.g. Williams 1988). The growth of agriculture "has taken place at the cost of the modification, and in many cases the deterioration, of the ecosystems in which intervention has occurred as a result of the modernization process." (Sunkel 1980, p.33)

Sunkel has pointed out that Latin America adopted a "style of development", similar to capital- and energy-intensive US model, which has been paid for with exports of primary products (see also Cardoso 1980, Gligo 1993). Agriculture as well as industry has become heavily capital intensive, leading among other things to the increasing displacement of labor and the "artificialization" of agriculture. Although the primary sectors are shrinking as a share of GDP, the expanding secondary and tertiary sectors are highly dependent on natural resource inputs, particularly energy. Sunkel points to the unequal division of resources as the source of a dual production structure in which export agriculture has become highly mechanized and input- and energy-intensive. The domestic food production sector, which is labor-intensive and based on local resources, has been largely ignored by modernization efforts (see also Twomey and Helwege 1991, Grindle 1986). Modernization of export agriculture has led to displacement of labor and migration to the urban and frontier areas. Primary products are serving to support a society and economy which are largely urban. Depletion and destruction of resources is linked with extreme specialization and artificialization of agricultural development (Sunkel 1980), as well as the expansion of the agricultural frontier by both large-scale operations and small farmers.

#### Debt Accumulation and Crisis

This expansion was not a success, however, in the sense that few countries were able to raise their share of world exports (just Ecuador and Venezuela, two oil exporters). Despite the increase in resource-based output during the period (figures 4.1, 4.2), earnings did not keep pace with the rapidly rising foreign debt. Vulnerability to external shocks remained high, as the 1980s revealed. During the

Table 4.8  
Latin America: Economic Indicators 1981-1993

Year	GDP 1988 \$	Exports US\$ millions	Imports	Trade Balance	Current Account	Debt service/ Exports	Terms of Trade 1980=100
1981		122,122	134,909	(12,787)	(40,680)		94.2
1982		102,936	104,815	(1,880)	(40,986)		87.0
1983		107,670	81,831	25,839	(9,122)		88.1
1984	801,397	119,396	83,926	35,471	(1,177)	40.1	93.7
1985	823,384	108,618	77,826	30,792	(3,687)	38.8	89.4
1986	860,951					44.6	81.4
1987	890,127	108,002	89,342	18,660	(10,829)	38.7	81.7
1988	894,941	123,088	101,844	21,244	(11,163)	40.6	80.6
1989	899,839	136,380	108,779	27,601	(6,934)	33.8	80.3
1990	899,441	150,568	125,988	24,580	(3,591)	26.5	79.0
1991	933,119	151,312	145,203	6,109	(18,819)	27	73.4
1992	960,203	161,286	176,140	(14,854)	(37,172)	30.5	69.4
1993	993,855	168,645	189,890	(21,245)	(44,909)	31.1	68.6

Sources: ECLA, IDB

Table 4.9  
Growth of Per Capita Incomes

<u>Country</u>	<u>1950-80</u>	<u>1981-89</u>
Brazil	4.2	0.0
Mexico	3.0	-1.0
Argentina	1.8	-2.6
Colombia	2.3	1.5
Venezuela	1.5	-2.8
Peru	2.1	-2.7
Chile	1.8	1.1
Uruguay	1.4	-0.8
Ecuador	3.1	-0.1
Guatemala	1.8	-2.0
Dominican Republic	2.6	-2.9
Bolivia	1.3	-2.9
El Salvador	1.3	-1.9
Paraguay	2.4	0.0
Costa Rica	3.3	-0.7
Panama	2.9	-1.9
Nicaragua	2.3	-3.7
Honduras	1.4	-1.3
Haiti	0.7	-2.1
Latin America	2.7	-0.8

Source: Cardoso and Fishlow 1992

1970s, both oil importers and oil exporters imported capital at rates that could not be sustained when the commodities markets collapsed. The commodity boom was treated as a long-run improvement in terms of trade, and loans were taken and investments made in the primary sector on the basis of what turned out to be a short-term fluctuation. Current accounts stood in deficit even in the best years of the 1970s.

The role of the state had grown dramatically in the post-War period, with the state taking on a wide range of responsibilities in industrial development, banking, and social sectors. In most countries, however, state resources remained too small to carry out the state's new tasks, leading to extensive borrowing. The weakness of domestic capital markets and the fear of inflation made foreign borrowing more attractive than domestic borrowing. At the same time, international liquidity was swelled by a combination of US deficits and petro-dollars. Growth of commercial lending to Latin America, which had been minimal since the defaults of the 1930s, was facilitated by this easy availability of international capital and the development of syndicated and variable interest loans. While commercial funds flowed mainly to the large countries of the region, the smaller countries enjoyed increases in flows of official capital. Loans allowed Latin American countries to postpone stabilization and adjustment measures needed to deal with internal and external imbalances, and allowed for continued high levels of imports. At the same time, the loose balance of payments constraints of the 1970s permitted some structural transformation in the larger Latin American economies, reflected today in the increased share of manufactured products among exports (Batista 1993, Sanderson 1992).

Commercial lending in the region soared beginning in the late 1960s and continued even after the collapse of commodity prices in the late 1970s, until Mexico threatened default in 1982. Latin American foreign debt rose from US\$ 184 billion to US\$ 314 billion between 1979 and 1982 alone, with debt service ratios more than doubling (Bulmer-Thomas 1994). The second oil crisis, however, brought a conservative monetarist response from the developed countries which drove interest rates up sharply

and forced commodity prices down. Receipts from both oil and non-oil exports peaked in 1981, after which terms of trade fell sharply (Bulmer-Thomas 1994). The crisis began in 1982 when new lending slowed to a trickle.

The parallels between the debt crisis of the 1980s and earlier crises are numerous (Fishlow 1989, Marichal 1989).<sup>67</sup> Initial responses to rapid capital outflows and balance of payments crises focused on import controls. Long-term adjustment has required expansion of exports and import reductions through import-substitution and reductions in consumption in order to support a net outflow of capital. Yet, as in other periods, the loss of capital inflows were accompanied by a contraction of international trade, reducing the possibility of repaying the debt with exports. The negative growth (table 4.9) and chronic inflation (table 4.5) of the 1980s in Latin America bears witness to the continuing dependence on imported goods and capital (Cardoso and Fishlow 1992). This brings us back to the discussion in the initial chapters of the relation between exchange needs and resource use. The consequences of import-substitution, export-promotion, and responses to the debt crisis will be more carefully explored in the case study of Brazil.

#### Consequences for the Agricultural Sector

Growth of the agricultural sector has been less severely affected than the industrial sector, not surprisingly given its reliance on domestic natural-resource inputs. Nevertheless, in the context of general macroeconomic contraction, low international commodity prices, high input prices, and the elimination of many government support programs, agricultural growth has not been strong. Real devaluations were expected to promote agricultural export expansion. However, Helwege suggests that, despite a decline in production of some domestic foodstuffs, domestic and export production were not

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<sup>67</sup> One difference between this crisis and previous crises is that the debt is owed to commercial banks rather than bondholders, which increases the interest of banks in enforcing repayment.

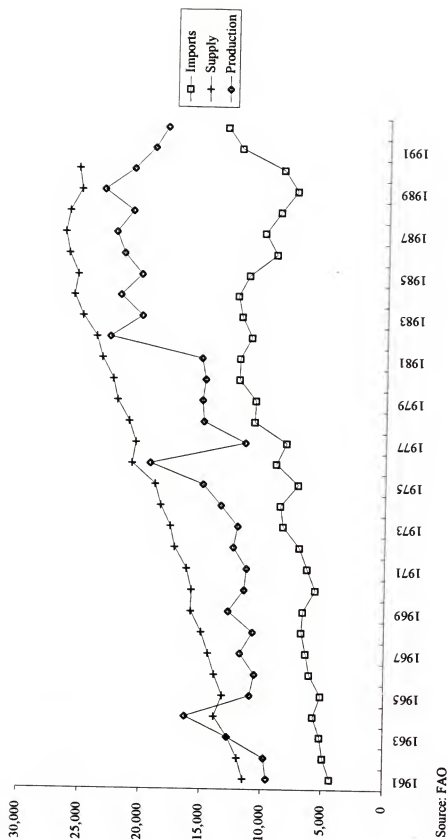


Figure 4.5  
Latin America: Wheat Supply  
(1000 MT)



Table 4.10  
Latin American Wheat Consumption

<u>Year</u>	<u>Kg/year Per caput</u>
1961	43.90
1962	44.60
1963	45.60
1964	47.70
1965	44.50
1966	46.00
1967	46.10
1968	46.50
1969	46.10
1970	47.10
1971	46.70
1972	45.10
1973	49.10
1974	49.50
1975	49.00
1976	51.40
1977	50.70
1978	51.60
1979	52.50
1980	52.90
1981	53.50
1982	53.00
1983	55.50
1984	55.50
1985	52.30
1986	52.40
1987	51.90
1988	51.30
1989	48.30
1990	47.90

Source: FAO

always substitutes. Exports require not only natural-resource and labor inputs but also capital investment and marketing infrastructures, and international demand. As suggested in Chapter 3, some of the adjustment came through agriculture import-substitution, rather than export expansion. Wheat imports in particular fell in the 1980s and per capita wheat consumption has not recovered (table 4.10, figure 4.5). Overall food production per capita has not fared well, with foods consumed by the poor showing the worst performance. Tradeable crops, including exports and import substitutes, have shown stronger growth.

Those countries which devalued early in the 1980s experienced stronger growth in agricultural output (Helwege 1990). This parallels the experience of the 1930s when countries which devalued early recovered markets (Thorp 1984, Diaz-Alejandro 1984). However, exchange rates and world prices were not the only determinants of growth. Domestic markets, government policies, and the tradeability of products have also played a role, and in the crisis of the 1980s appear to have shifted adjustment to the imports and consumption side of the equation. Land has paid the price of adjustment. High reported rates of deforestation (table 4.7) in the 1970s and higher rates in the 1980s reflect the increasing extraction of "cheap" natural resources in the face of falling import capacity and rising need for foreign exchange.

### Some Conclusions

This history has illustrated Latin America's longstanding dependence on primary product exports. Periods of economic growth have been determined in large part by the availability of foreign exchange to finance imports, provide government revenue, and service loans. Since the industrial sector in most countries has remained unable to compete at the international level, primary commodities have been required to bear the burden of producing foreign exchange earnings. Given governments' dependence on exports for general revenue and for debt-service payments, and a widespread belief in the

validity of export-led growth models, policies favoring resource exploitation are not surprising. More surprising perhaps is the period of inward-looking policies in which exports were given less priority. This was possible, of course, only in those countries which were sufficiently industrialized and had sizeable domestic markets such that domestic production could meet consumption and industrial needs. For the smaller countries, commodity exploitation remained the only route. That export-led growth was an inadequate path to development is clear not only in the lack of development progress<sup>68</sup>, but also in the widespread environmental degradation which has accompanied that development model. However, import-substitution responses to international pressures, which occur through policy or by force of international market conditions, have entailed their own dependency on resource exploitation.

Although the importance of (potentially) renewable resources has diminished in Latin American countries, they still compose 10% of GDP, and over 60% of exports (ECLA). In terms of exports, natural-resource-based products are still of critical importance. Efforts at diversification have had little impact in the smaller countries. Primary commodities remain Latin America's main access point to the international economy. While some governments and economies managed to delink themselves from exports to an extent in the 1950s and 1960s, the persistent need for foreign exchange never allowed a complete escape, and the easy loans of the 1970s followed by the inevitable debt crisis reestablished the links very clearly. The inability of primary-product export earnings to cover debt payments in the 1980s has focused attention on the need to develop more diversified and competitive industries.

The most recent theoretical and policy swing is to neo-liberalism. Integration into the world economy, exposure of domestic industry to competition, and once again, exploitation of comparative advantage in cheap labor and natural resources are advocated as the road to growth. This view--that Latin America has been crippled by a high degree of state intervention in the economy (e.g. Lal) that has

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<sup>68</sup> A recent paper (Sachs and Warner 1995) has found a high correlation between rapid economic growth and lack of natural resources among developing countries. However, these countries may be heavy users of imported natural-resource products, including fuels.

led to inefficient production and allocation of resources and prevented economic growth--has become the new orthodoxy of development institutions and of many Latin American governments.

The resulting policy push in the 1980s and 1990s has been to further open these economies and further promote exports. Whether this is a return to the default orthodoxies or simply an acknowledgement of a persistent relationship is debatable. What we seem to have learned from earlier experiences with free trade, and from periods of protectionism as well, is the need to diversify the range of products for export. Whether such diversification can be achieved in the current anti-state climate remains to be seen. Unfortunately, the neo-liberal approach ignores Latin America's long experience with free trade and liberalism, which has not shown that resource-based exports will lead to the type of growth needed in Latin America. Also ignored are the environmental implications of Latin America's continuing reliance on resource-based exports.

The main idea of this chapter is that resource exploitation in Latin America has been largely determined by external factors, mediated by domestic policy. While nature has put certain limits on the range of natural-resource exports that can be produced, a variety of domestic and international economic, political, and social factors have kept Latin America dependent on resource-based exports. Even if comparative advantage in particular natural resources initially determines what crops are produced, external factors can be expected to determine the scale of production for trade. Although this dependence has been lessened for the larger countries, current policy turns suggest that resource-based exports will increase in importance in the coming years. The ups and downs of commodity prices and changes in economic policies have not changed the fact that Latin American economies depend heavily on resource exports, although market instability has shaped and reshaped these economies.

Consideration should be given to the fact that the idea of comparative advantage lies at the heart of both trade theory and neo-liberal ideas about the environment. Yet where trade theory provides only a static model of comparative advantage, history reveals sometimes rapidly evolving trade patterns.

While a country may shift its comparative advantage from one commodity to another, very rarely does the change take place in the physical commodity itself. Rather, demand for commodities is generated by societies and nations, and supply is determined by the feasibility of exploitation and the other opportunities available. Latin America's history has been one of increasing feasibility of resource exploitation, with little creation of other opportunities. Whether trade was primarily with Spain, Great Britain, or the US, the demand side of the equation was largely described by the Northern developed countries which have emphasized maximizing production rather than maximizing development. Developed countries contribute to environmental problems in the South through large per capita demands on resources, demands which cannot be met by the industrial country resource base. Resource exploitation is part of the larger relationship Latin America has with the rest of the world in which it has been struggling to attain the status of the industrial countries.

The current need for foreign exchange for debt-service payments is not a new phenomena. Latin American governments have consistently relied on export earnings for government revenue and to service loans. The idea that exports can be used to fund the imports needed for development is clearly not new either. By this point we should have learned that for Latin America to export its way out of debt will entail large resource costs, and that exporting for development has not proved very successful. Domestic change in the middle of this century was induced not by improvements in trade but rather by a collapse in trade, giving us little reason to look to trade for progress (Sanderson 1992). The only slowing of resource exports came when Latin America made a deliberate effort to remove itself from the path of commodity dependency onto the industrial track. Yet, industrialization is not necessarily an environmentally sound development path. Although industrialization could relieve pressure on land for export and subsistence agriculture uses it entails its own range of environmental damage and dependency on energy supplies.

## CHAPTER 5

### THE BRAZILIAN CASE

Deforestation of the Brazilian Amazon is perhaps the most infamous case of land-use change in recent decades. Lying behind the development and degradation of Brazil's frontier lands are tremendous changes in economic and agricultural patterns in other regions of the country. Continuing agricultural development and expansion are the proximate cause of much frontier expansion. Although Brazil has achieved greater industrialization than most Latin American countries in this century, and agriculture accounts for an ever-shrinking share of GDP and of employment, it remains critical to domestic food supply, industrial raw materials supply, and foreign exchange earnings. Changes at the frontier reflect a number of factors including not only the failure of the modern, often capital-intensive, sectors of the economy to absorb the labor displaced from traditional agriculture, but also the continuing need to increase agricultural production to meet domestic needs and reduce foreign exchange requirements.

Dramatic changes have taken place over the last thirty years (1964-1994) in Brazilian agriculture in terms of expansion, modernization, and diversification. Coffee, which accounted for 70% of exports (Fritsch 1988) in the 1940s and almost 60% in the 1950s (Baer 1995), has been replaced by a diversified range of export crops. Traditional domestic food crops, displaced by expanding modern-sector agriculture, have been pushed consistently toward the agricultural frontier without receiving the benefits of sectoral modernization. Among the most striking changes is the increasing use of "export" crops domestically, and the rapid growth of agricultural industries. While these changes have increased the level of industrialization, and initiated modernization of the domestic food production sector, the

changing agricultural structure has not reduced Brazil's dependence on exploitation of its land resources. Yet, frontier expansion, once integral to agricultural growth, is increasingly a residual effect of changes in production patterns in established agricultural areas, which raises questions about the value gained from this resource exploitation.

The transformation of much of Brazilian agriculture and the expansion of the frontier can be linked to a few critical external and internal pressures on the economy, related to the need to promote development in the face of often adverse international conditions. Brazilian economic policy and agricultural sector policies have reflected national efforts to manage international trade relations and external accounts. Changing expectations of the contribution of the agricultural sector to the national economy and trade have been reflected in macroeconomic and sectoral policies. "Government policies toward agriculture have been influenced by gradually shifting perceptions regarding both the importance of the sector in national development and the resource constraints on its growth." (World Bank 1982, p.2) Throughout the post-War period, government policies have remained primarily developmentalist, with heavy state involvement in many markets and productive sectors. Interventions have aimed at promoting industrial development, GDP growth, and foreign exchange earnings. Within this developmentalist model, however, macroeconomic and sectoral policies have responded flexibly to largely external economic constraints and opportunities.

### The Position of the Brazilian Economy

In comparison with other Latin American countries, the Brazilian economy has been shielded from international pressures, by virtue of its large domestic economy, substantial resources, and low openness ratio.<sup>1</sup> Nevertheless, Brazil's position in the world system entails a dependence on world

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<sup>1</sup> Openness ratios can be measured as exports/GDP or (exports+imports)/GDP. Both indicators provide some information about the importance of trade to the economy. However, the response to external shocks will depend not on the ratio but on the flexibility of export production and import-substitution responses.

markets for imports and on inflows of capital to fund development. Imports and debt servicing are dependent on export earnings.<sup>2</sup> The limited range of policy options for managing that relationship while promoting domestic growth is dictated by the availability of capital, the debt burden, and market opportunities, as well as by the capacity of the domestic economy to generate real resources. Brazil has not been an exception to the Latin American pattern of dependence on natural resource exports and repeated debt crises.

Despite Brazil's large domestic market, foreign exchange considerations have often taken a prominent place in policy. This is not surprising given Latin America's historical dependence on export earnings (see Chapter 4) and the relevance of the foreign exchange gap and development hurdles (see Chapter 3) in analyzing Latin American economies. The analyses of Leff and Delfim Netto (1994) and Carvalho and Haddad (1981), discussed in Chapter 3, suggest that Brazil's exports are limited by demand in international markets, not by domestic absorption of resources or demand for imports. An increase in international demand or a lowering of export restrictions will both have the effect of diverting resources to the export sector. Because demand for foreign exchange and imports is unmet, exports will be increased when it is possible to raise foreign exchange earnings.<sup>3</sup> Moreover, growth simply increases demand for imports of consumer goods, capital goods, and energy. Carvalho and Haddad find that natural-resource-based exports from Brazil are correlated with the real exchange rate and with the size of world demand.<sup>4</sup> The exchange rate in part reflects the demand for foreign exchange earnings, while

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<sup>2</sup> A fairly consistent relationship between exports and imports and GDP is suggested by figure 5.4.

<sup>3</sup> Carvalho and Haddad (1981) show that this holds for natural-resource based exports as well as for manufactures.

<sup>4</sup> Brandão and Carvalho (1991a) look at effects on agricultural policy of foreign exchange availability, world price levels, and the rate of unemployment, with variable results from crop to crop and few significant results. This may reflect the fact that many crops are both domestic and export crops.



world demand levels limit earnings. Inflexibility of production and policy restrictions, however, have limited the export response.

The last thirty years have seen a wide range of policy approaches to varying international demand conditions and varying international availability of capital. Throughout the period, government trade policies have been geared in various ways to alleviate the constraints on growth and self-sufficiency created by the foreign exchange gap. While in the 1950s a reduction in the import bill had been seen as the best way to relieve foreign exchange constraints on economic growth, in the 1960s policy-makers turned instead to expansion and diversification of exports. The shocks of the 1970s led again to efforts to reduce imports, while the easy availability of foreign capital encouraged debt accumulation to meet foreign exchange needs. The post-debt-crisis approach has emphasized liberalization to increase exports once again. These see-sawing trade positions have been established by macroeconomic policy responses to foreign exchange constraints, including use of exchange rate policies, shaping of internal terms of trade, and debt accumulation. Efforts to reduce imports have consistently encountered limits to import-substitution—necessary imports of raw materials, capital goods, fuel, and foodstuffs have precluded real self-sufficiency. Efforts to increase exports have consistently encountered inelastic international demand for commodities, unstable international prices, and industrialized country protectionism against industrial and processed agricultural products (Abreu and Fritsch 1987), and have often entailed reduction of domestic production.

Efforts to reduce external imbalance have run counter to efforts to ensure domestic balance and economic growth in Brazil. The country faces the often conflicting policy objectives of controlling inflation, maintaining growth, and meeting the foreign exchange requirements created by the need for imports and by debt obligations.<sup>5</sup> Dornbusch and Edwards (1991, also Cardoso and Helwege 1991)

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<sup>5</sup> Bacha (1980) provides one of the most useful discussions of the disjunction between external and internal policy requirements.

argue that the "populist" regimes of the post-War period have repeatedly generated economic crises because they have mistakenly emphasized domestic growth while ignoring fiscal and foreign exchange constraints. However, throughout this era policies reveal deep concern with the foreign exchange gap. Poor international market conditions have often made it difficult to meet these needs and to resolve the conflict between external and internal balance. While the favorable conjunction of international conditions in the late 1960s and early 1970s allowed for strong economic growth and control of inflation, since the oil crises less favorable goods and capital markets have aggravated Brazil's domestic economic problems. The roots of Brazil's inflation problems lie partly in the efforts of the Brazilian government to promote domestic economic growth, and growth of import-substitute and export sectors, to relieve balance of payments constraints. These efforts have entailed government deficit spending, substantial borrowing, and restrictions on imports, all contributing to inflation and domestic imbalance. The provision of "cheap" resources to encourage growth has taken a great variety of forms outside of direct government spending, from measures to keep labor costs low, to industry subsidies, to negative interest rates, to accumulation of foreign debt, and to encouragement of agricultural expansion.

### The Role of Agriculture

Agriculture stands at the intersection between policies aimed at domestic and international balance in Brazil. Agricultural production has played a role in meeting foreign exchange requirements, in controlling inflation (through low food costs), and in supporting industrialization by ensuring provision of inputs and low labor costs. Despite the centrality of the sector, macroeconomic policies have often ignored agriculture because of a political and ideological preference for the industrial and urban sectors (Cardoso and Helwege 1991).<sup>6</sup> "Cheap" resources have been extracted from the

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<sup>6</sup> The roots of this bias lie in our understanding of development as equivalent to industrialization and urbanization; and also in the ECLA understanding of the commodity trap (see Chapter 4).

Table 5.1  
Land Use Summary  
1000 ha and growth rates

	Agricultural Land Area	Arable Land and Permanent Crops		Arable Land		Permanent Crops		Permanent Pasture	
		Change	Change	Change	Change	Change	Change	Change	Change
1961	150,531		28,396		20,751		7,645		122,135
1965	167,200	11%	30,900	9%	23,100	11%	7,800	2%	136,300
1970	188,122	13%	33,984	10%	26,000	13%	7,984	2%	154,138
1975	205,001	9%	40,001	18%	31,616	22%	8,385	5%	165,000
1980	220,518	8%	49,104	23%	38,632	22%	10,472	25%	171,414
1985	230,081	4%	52,281	6%	42,420	10%	9,853	-6%	177,800
1990	244,200	6%	60,000	15%	50,400	19%	9,600	-3%	184,200
1961-90		62%		111%		143%		26%	51%

Source: FAO

Table 5.2  
Population

Distribution thousands

	1950	1960	1970	1980	1991
North	1,845	2,562	3,604	5,880	10,257
Northeast	17,973	22,182	28,112	34,812	42,470
Southeast	22,548	30,631	39,853	51,734	62,661
South	7,841	11,753	16,495	19,031	22,117
Center-West	1,737	2,943	5,073	7,545	9,412
Brazil	51,944	70,070	93,138	119,003	146,917
Agricultural Labor Force		12,279	14,166	13,784	13,304

Density: person/square km

	1950	1960	1970	1980	1991
North	0.52	0.72	1.01	1.65	2.89
Northeast	11.65	14.38	18.23	22.57	27.54
Southeast	24.54	33.34	43.38	56.31	68.20
South	13.95	20.91	29.35	33.86	39.35
Center-West	0.92	1.57	2.70	4.01	5.01
Brazil	6.14	8.29	11.01	14.07	17.37

Source: IBGE, FAO

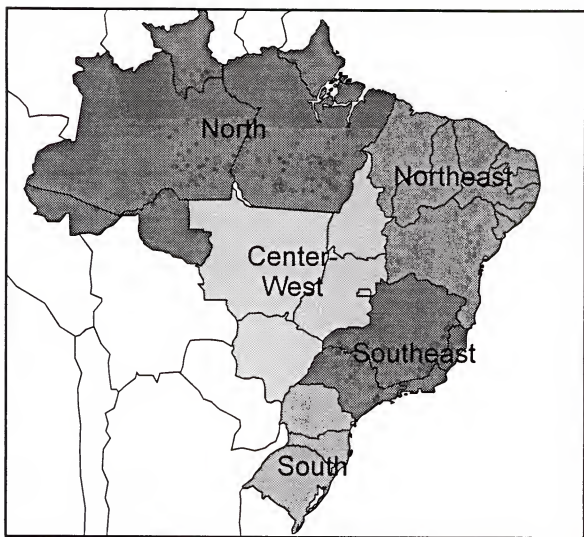


Figure 5.1  
Map of Brazil

agricultural sector to subsidize growth and ensure international competitiveness and to close the foreign exchange gap. At times this has required considerable government investment in infrastructure and subsidies; the Brazilian government has played an important role in the modernization and expansion of export and industrial crops. The response of agriculture to changing economic incentives and markets is necessarily slowed by the planting cycle, particularly for perennials, and by limitations of physical resources. Yet, while there are limits on the extraction of resources from labor and fiscal expansion, expansion of agricultural land faces no such limits as long as environmental costs are unacknowledged. The ready availability of agricultural land has largely precluded the need for other government support for agricultural production. The expansion of agricultural land has thus provided a "costless" solution to both domestic and international pressures in the post-War period.

Despite widely varying economic and trade policies offering varying (dis)incentives to both domestic and export agriculture, both agricultural production and land use have expanded very steadily. Traditionally, expansion has been the main mechanism for increasing production (table 5.1). More recently, agricultural intensification and improving yields have gained precedence. This trend has not relieved expansionary pressure. In fact, agricultural intensification has provoked agricultural expansion through the displacement of rural populations and domestic crop production. While the agricultural labor force has increased very little in recent decades, it is now more widely dispersed (table 5.2). The land area devoted to perennial and annual crops has more than doubled from 28 million ha in 1961 to 60 million ha in 1990, with a particularly large expansion in the 1970s. Most of the expansion has been in annual crops. Land in permanent pasture has increased by 52% since 1961. Forested land and *cerrado*<sup>7</sup> have decreased as cropland and pasture have expanded (FAO, IBGE).

The macroeconomic conditions which have driven the Brazilian economy must be understood in order to understand the behavior of the agricultural sector and the evolution of agricultural land-use

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<sup>7</sup> *Cerrado* is savannah-like vegetation that covers about one-third of Brazil, primarily in the Center-West.

patterns. Because of the central position of agriculture in the economy, macroeconomic events exert a profound influence on agricultural production, both directly and indirectly through government policy responses. In turn, the response of the agricultural sector directly affects land-use patterns. This analysis of trade impacts on land use must necessarily start with a review of the relevant macroeconomic history. This chapter will discuss economic policies and the international economic conditions faced by the Brazilian economy, with special attention to the role of trade and foreign exchange. The periodization is based loosely on changes in government policies toward the external sector. Chapter 6 will focus on changes in agricultural policy, the role of the agricultural sector, and approaches to land use. Chapter 7 will examine specific changes in agricultural land-use and production patterns. The discussion of Brazil's economy below should illustrate the country's use of exports and import substitution to manage its foreign exchange and import needs, and provide evidence of the extent to which these needs have been a dominant concern. The discussion of agriculture which follows should illustrate the role of this natural-resource-based sector in providing resources for these efforts.

#### Export Promotion and the Economic Miracle: 1964-1973<sup>8</sup>

The military takeover of 1964 was primarily the result of a decade-long breakdown of civilian government that began with the last years of President Getúlio Vargas (1951-54) (Skidmore 1988). But it was also a response to the poor economic growth and rising inflation of the early 1960s (Baer 1995, Skidmore 1988). Import-substitution industrialization policies followed in the 1950s had provided a number of years of strong economic growth, averaging 8% annually (Clements 1988), but had neither

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<sup>8</sup> This macroeconomic review draws on Bacha (1980), Baer (1989, 1995), Batista (1993), Clements (1988), Coes (1991), Graham and Wilson (1990), Lal and Maxfield (1993), and Skidmore (1988). Cites are given where appropriate. Basic economic indicators are found in tables 5.3, 5.4, and 5.5.

Table 5.3  
Brazil--Economic Indicators

Year	GDP	GDP Sectoral Shares:		Inflation	
	US \$ billions	Growth (%)	Agriculture % GDP		
			Manufacturing % GDP	%	
1964		2.9	17	32	90
1965		2.7	16	33	58
1966		5.1	13	34	38
1967		4.8	13	33	27
1968		11.2	12	35	27
1969	42.30	10.0	11	36	20
1970	49.18	8.7	10	36	16
1971	58.51	11.3	11	36	20
1972	79.24	12.3	10	37	19
1973	105.09	14.4	11	38	23
1974	123.65	9.0	12	38	35
1975	152.61	5.2	11	37	34
1976	176.08	9.8	13	36	48
1977	200.71	4.6	15	34	45
1978	224.87	3.2	14	33	39
1979	234.91	6.8	13	32	56
1980	263.43	9.1	13	34	110
1981	281.54	(4.4)	13	34	95
1982	203.21	0.6	12	35	100
1983	208.92	(3.4)	12	35	211
1984	222.97	5.4	13	35	224
1985	268.15	7.9	13	33	235
1986	294.09	8.4	11	39	65
1987	329.91	3.3	11	38	416
1988	448.76	(0.3)	9	43	1038
1989	479.21	3.3	9	43	1783
1990	405.77	(4.6)	10	39	147
1991	395.29	0.4	10	39	480
1992		(0.9)	11	37	1158

Source: World Bank, IMF, Latin American Center, Knight, Papageorgiou et al., Baer

eliminated the need for imports nor controlled inflationary pressures over the long run.<sup>9</sup> The first years of the 1960s were marked by a dramatic slow-down in economic growth<sup>10</sup> and climbing inflation. The bottleneck created by ISI policies and low commodity prices were at least partly to blame.

The immediate response of the new military government to economic stagnation and inflation was fairly orthodox. Restoration of economic growth was the central concern. The new military government adopted the neoclassical position that ISI policies, led by tight controls on exports and imports, had created bottlenecks in the economy preventing further growth; thus the slow-down in the early 1960s.<sup>11</sup> Orthodox remedies included tight fiscal and credit policies and repression of wages to bring down inflation. The consequent recession extended the period of economic stagnation through 1967 (table 5.3). Growth-promoting policies included modernization of capital markets, incentives for direct investment and foreign capital inflows, and government investments in infrastructure and heavy industry.

Beginning in 1968, with the deficit virtually eliminated and inflation held down to a historically reasonable 20% a year, economic policies were loosened, allowing for increased imports and domestic consumption (Coes 1991). The Brazilian Economic Miracle began<sup>12</sup>; growth rates surged, averaging

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<sup>9</sup> ISI policies were markedly inward-looking; foreign economic policy in the 1950s was intended to promote domestic industrialization and domestic self-sufficiency. Exchange rate controls and tariffs, with effective rates up to 250%, and non-tariff barriers, such as the Law of Similars, were used to control imports. Exports were either neglected or disfavored by long periods of exchange rate overvaluation. As result, the commodity structure of exports remained virtually unchanged in the 1950s and export growth averaged only 1.2% annually 1947-63 (Clements 1988). Favorable policies towards foreign capital, as well as the attraction of the highly protected Brazilian market, encouraged private capital inflows (Baer 1995). The structure of imports changed considerably as the import of consumer durables was drastically reduced through import controls and substitution. Substantial import substitution was also achieved in intermediate and capital goods (Clements 1988).

<sup>10</sup> Growth fell from 10.3% in 1961 to 1.5% in 1963.

<sup>11</sup> The structuralist understanding (e.g., Baer 1995, Furtado 1971) points to the lack of domestic markets resulting from poor income and property distribution, and to the capital-intensive nature of ISI industry that makes no contribution to improving income distribution, to explain the shutdown.

<sup>12</sup> Bacha (1980) argues that the Miracle was not a miracle but simply a recovery of interrupted growth.



over 11% until 1974 (Baer 1995). Industry led the economy with the most rapid sectoral growth. The domestic market, especially for consumer durables, provided the largest source of demand for industrial output (Clements 1988), although manufactured exports also began to increase. In the first years of the Miracle, industry expanded by bringing excess capacity into use; in the early 1970s, however, capital needs increased as more investment was needed to meet demand, and as government investment increased. As industry expanded, agriculture's share in GDP declined consistently from 1959 to 1970.

### Trade Policy and Patterns

Trade policy played a central role in the military government's economic strategy, and much of the growth of the period has been attributed to trade policy (Von Doellinger 1975, Coes 1991). Expansion and diversification of exports, especially manufactured exports, were considered essential to the healthy recovery of the economy. To this end, export policies and capital markets, and later import policies, were reformed. In essence, despite the initial orthodox leanings of economic policy, the military government grafted a program of export promotion onto the ISI policies that had proved successful in promoting growth in the 1950s. Under the pure ISI approach, exports had been largely ignored. Although agricultural exports were expected to provide the foreign exchange needed to support the development of domestic industry, they were often disadvantaged by government policy rather than supported. The more outward orientation after 1968 recognized the continuing need for imports, without abandoning import-substitution efforts. Policies were intended to increase the share of manufactures in exports as well as to increase total exports, and were intended to reduce the dependence on primary product exports, especially coffee.<sup>13</sup>

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<sup>13</sup> In the early 1960s, primary products still accounted for over 90% of exports. Coffee accounted for about 50% of exports.

Export sector reforms begun in 1964 focused on manufactures and were designed to reduce the anti-export bias of ISI policies, in an effort to prevent the economic bottlenecks of the early 1960s. By the early 1970s, these reforms evolved into an active export-promotion program (Coes 1991). Fiscal incentives for manufactured exports, many of which remained in place through the 1980s, included a drawback policy on imported inputs and exemption from several federal and state taxes. Credit incentives for manufactures included subsidized loans for exporters and a tax credit premium (the *crédito prêmio*).<sup>14</sup> Import liberalization, introduced in 1967, included a reduction in nominal tariffs.<sup>15</sup> By introducing import liberalization after export liberalization Brazil probably avoided many of the short-term recessionary costs, e.g. unemployment of labor and capital, often associated with trade liberalization (Coes 1991).

Exchange rate policies were less effective in reducing the anti-export bias initially. From 1964 to 1967 the government implemented a number of large devaluations, but the long periods between devaluations allowed for re-appreciation of the currency and jeopardized exports. In 1968, an exchange rate policy based on frequent, unpredictable, mini-devaluations, essentially a crawling peg, was adopted to prevent overvaluation of the cruzeiro. While the exchange rate was still often overvalued as a result of persistent inflation and liberalization of capital flows, the crawling peg system of devaluations reduced variations in the exchange rate (table 5.7) and so gave a strong stimulus to exports (Bacha 1980, Coes

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<sup>14</sup> These incentives were very substantial, as they had to overcome the attractiveness of producing for the protected domestic market. Export incentives averaged 58.93% of FOB value annually in the 1970s (Clements 1988). The *crédito prêmio* offset, and often exceeded, the burden of labor taxes for export producers.

<sup>15</sup> Nominal tariffs were reduced from an average of 54% (1964-66) to 39% (1967). Real tariffs were probably lower than nominal tariffs given the increased frequency of special reductions and exemptions for importers from both tariffs and non-tariff restrictions (Coes 1991, Clements 1988). Given the redundancy of many tariffs, the tariff reduction was probably largely ineffective; the exemptions bear more responsibility for increased imports (Clements 1988). Coes argues that, nevertheless, real opening was achieved, especially on the export side.

Table 5.4  
Export Indicators  
 (US \$ millions, nominal)

Year	Merchandise Exports value, fob	Nonfuel Primary Products	Manufactures	Exports Growth (%)
1964	1,430			
1965	1,596			12
1966	1,741			9
1967	1,654			-5
1968	1,881			14
1969	2,311			23
1970	2,739	2,335	388	19
1971	2,904	2,350	530	6
1972	3,991	3,167	784	37
1973	6,199	4,779	1,337	55
1974	7,951	5,769	2,071	28
1975	8,670	6,098	2,371	9
1976	10,128	7,377	2,500	17
1977	12,120	8,763	3,141	20
1978	12,659	8,128	4,335	4
1979	15,244	9,140	5,876	20
1980	20,132	12,005	7,770	32
1981	23,292	12,650	9,465	16
1982	20,173	10,758	7,971	-13
1983	21,898	11,828	8,911	9
1984	27,005	13,706	11,472	23
1985	25,639	12,506	11,503	-5
1986	22,382	10,772	10,911	-13
1987	26,229	12,079	13,203	17
1988	33,788	14,866	18,020	29
1989	34,379	14,703	18,827	2
1990	31,397	14,035	16,684	-9
1991	31,610	13,490	17,690	1
1992	35,955	14,595	20,792	14

Source: World Bank, IMF

Table 5.5  
Import Indicators  
 (US \$ millions, nominal)

Year	Merchandise Imports value, cif	Nonfuel Primary Products	Fuel Imports	Manufactures Imports	Imports Growth (%)
1964	1,086				
1965	941				-13
1966	1,303				38
1967	1,441				11
1968	1,855				29
1969	1,993				7
1970	2,845	531	351	1,962	43
1971	3,696	591	523	2,581	30
1972	4,776	690	643	3,443	29
1973	6,992	1,287	1,054	4,652	46
1974	14,163	2,199	3,372	8,591	103
1975	13,578	1,607	3,551	8,421	-4
1976	13,714	1,922	4,332	7,459	1
1977	13,254	1,832	4,502	6,920	-3
1978	15,016	2,435	4,937	7,645	13
1979	19,731	3,642	7,314	8,776	31
1980	24,949	4,010	10,749	10,190	26
1981	24,072	3,197	12,159	8,716	-4
1982	21,061	2,646	11,276	7,140	-13
1983	17,233	2,059	9,388	5,786	-18
1984	15,209	2,168	8,037	5,004	-12
1985	14,329	2,116	6,767	5,446	-6
1986	15,555	3,502	4,165	7,887	9
1987	16,578	2,585	5,397	8,595	7
1988	16,054	2,136	4,836	9,082	-3
1989	19,857	3,856	5,093	10,908	24
1990	22,458	3,722	6,009	12,726	13
1991	22,976	4,177	5,399	13,401	2
1992	23,115	3,624	5,142	14,349	1

Source: World Bank, IMF

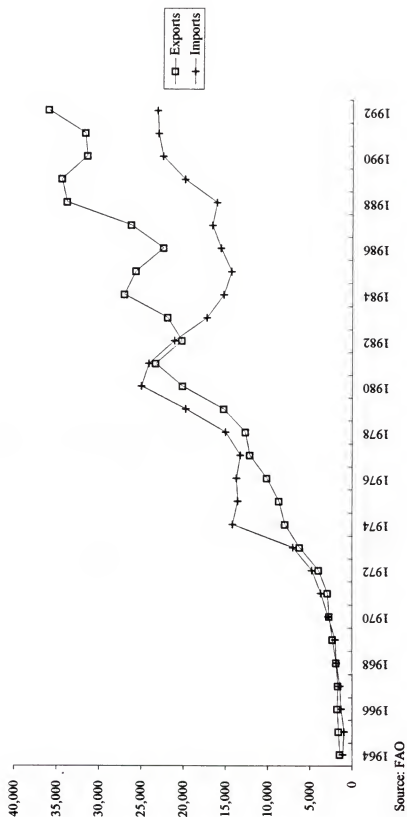


Figure 5.2  
Merchandise Trade  
(US\$ millions, nominal)

Source: FAO

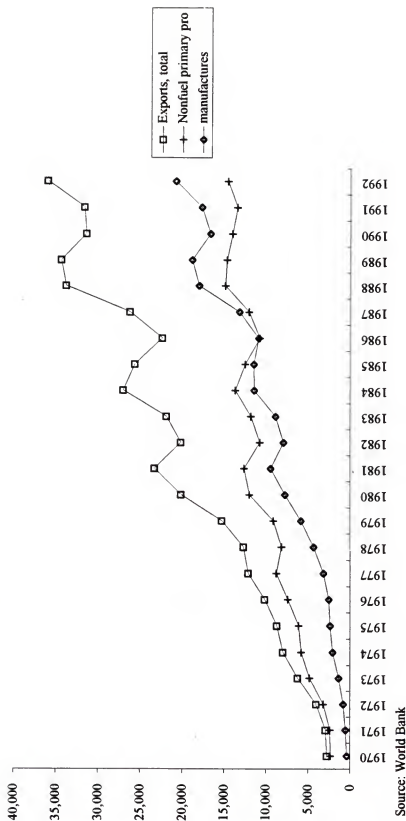


Figure 5.3  
Composition of Exports  
(US\$ millions, nominal)

1991). This system of exchange rate management remained in place through much of the following decades.<sup>16</sup>

International conditions were favorable to trade expansion, with rapid expansion of international goods and capital markets and improving commodity prices (Bacha 1980). Trade grew even more rapidly than GDP during the Miracle years, achieving growth rates of 14.7% annually between 1970 and 1973 (Baer 1995). Significant diversification of exports was achieved (tables 5.4, 5.5, figure 5.1). The share of coffee in exports, which had stood at 65% of agricultural exports in 1964 fell to just over 10% by 1974. New non-traditional primary exports, most notably soybeans, orange juice, and iron ore, gained substantial market shares. Manufactures comprised an increasing share of exports, rising from 7.2% of exports to 26% between 1965 and 1974 (figure 5.2). Diversification of international economic ties was also achieved beginning in the late 1960s. While 41% of Brazilian exports had been sent to the US in the 1950s, less than 18% went to the US by 1981 (Baer 1995). Imports, however, rose even faster, with manufactured imports leading.

The rising trade and services deficit was unproblematic in the short term as long as inflows of private and official capital easily covered the shortfall. Policies were favorable to foreign capital inflows, especially under the international monetary conditions of the period. Financial inflows increased substantially in the late 1960s and FDI began to expand in the early 1970s.<sup>17</sup> Expanding world markets allowed Brazil to accumulate foreign reserves. The trade balance was generally positive through 1971, although imports and GDP rose more rapidly after 1967 than exports (tables 5.6, 5.7; figures 5.3, 5.4).

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<sup>16</sup> Exchange rates were fixed for brief periods under the shock plans of the 1980s in an effort to control inflation and prevent revaluation.

<sup>17</sup> FDI in Brazil averaged US\$ 84 million per year 1965-1969, and rose to US\$ 1 billion per year 1973-1976. Foreign loans also rose rapidly from an average of US\$ 604 million to US\$ 6.5 billion for the same periods (Baer 1995). Capital inflows were diversified. Debt, however, was contracted primarily (77%) in US dollars, including over 30% from US private banks.

The combined effect of capital inflows and export promotion was real appreciation of the cruzeiro (Coes 1991), lowering the cost of imports.

The policies of the military government established a clear opening to trade. ISI policies of the 1950s had brought the imports/GDP ratio down to 5.4% in 1964. By 1974 it had risen to 16%. Exports/GDP rose from 5% in 1959 to 9% in 1974. This opening was in no way equivalent to the trade liberalization policies advocated today.<sup>18</sup> Rather than entailing a government withdrawal from markets, the new policies required substantial government involvement. Government presence in many sectors of the economy increased over the 1960s, and state companies dominated a number of critical sectors. If government investments and policies did not create the growth of the Miracle years, they certainly played a role in shaping the patterns of economic growth.

### Development Failures

The Brazilian Miracle did not resolve several fundamental socio-economic problems that have plagued the country's development. The problem of enormous income and wealth disparities<sup>19</sup> worsened in the 1960s, according to the 1970 census. A number of factors may have contributed to this increased disparity including the fall of real wages during the stagnation in the early 1960s; the increasingly

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<sup>18</sup> Coes, as part of a series of studies on trade liberalization in developing countries (Papageorgiou et al. 1991), finds that Brazil's trade liberalization of the 1960s does not fit the "conventional" model of trade liberalization in that 1) liberalization on the import side was limited and followed only after export promotion policies were established; 2) the intent of the liberalization was not to expose domestic industries to competition, that is, there was no intent to bring domestic prices in line with international prices; and 3) government administration of the trade sector and exchange rates was not reduced. The emphasis on administrative tools rather than prices became clearer following the first oil shock. Trade in the early 1970s was open, in that imports were allowed to grow but not liberal in that "trade remained subject to a high degree of government discretion." (Coes 1991, p.325) Dean et al. (1994) provide a useful discussion of the difficulty of defining and measuring trade openness.

<sup>19</sup> Brazil has perhaps the greatest income disparity in the world (Wood and Carvalho 1988, Bacha and Klein 1989); however, such comparisons are notoriously imprecise.



Table 5.6  
Brazil--Balance of Payments Indicators  
US \$ billions (nominal)

Year	Trade Balance (Merchandise)	Goods and Services:		International Reserves	Current Account Balance
		Exports	Imports		
1964	0.34	1.55	1.52	0.16	0.08
1965	0.66	1.76	1.55	0.45	0.28
1966	0.44	1.88	1.99	0.43	(0.03)
1967	0.21	1.84	2.19	0.20	(0.28)
1968	0.03	2.09	2.63	0.26	(0.53)
1969	0.32	2.60	2.97	0.66	(0.34)
1970	0.23	3.12	3.98	1.19	(0.84)
1971	(0.37)	3.33	4.98	1.75	(1.64)
1972	(0.25)	4.51	6.20	4.22	(1.69)
1973	(0.06)	7.04	9.22	6.51	(2.16)
1974	(4.75)	9.37	16.93	5.46	(7.56)
1975	(3.55)	9.94	16.95	4.17	(7.01)
1976	(2.39)	11.28	17.84	6.67	(6.55)
1977	(0.10)	13.51	18.62	7.44	(5.11)
1978	(1.16)	14.49	21.60	12.19	(7.04)
1979	(2.72)	18.00	28.49	9.84	(10.48)
1980	(2.82)	23.28	36.25	6.88	(12.81)
1981	1.19	26.94	38.87	7.48	(11.75)
1982	0.78	23.47	39.77	4.00	(16.31)
1983	6.47	24.34	31.29	4.56	(6.84)
1984	13.09	30.21	30.33	11.96	0.04
1985	12.47	29.31	29.74	11.62	(0.27)
1986	8.30	25.13	30.52	6.75	(5.30)
1987	11.16	28.73	30.25	7.48	(1.45)
1988	19.17	36.82	32.76	8.09	4.16
1989	16.11	38.82	38.04	8.73	1.03
1990	10.75	36.33	40.95	9.20	(3.79)
1991	10.58	35.84	38.81	8.75	(1.41)
1992	15.53	38.97	34.98	23.26	4.10

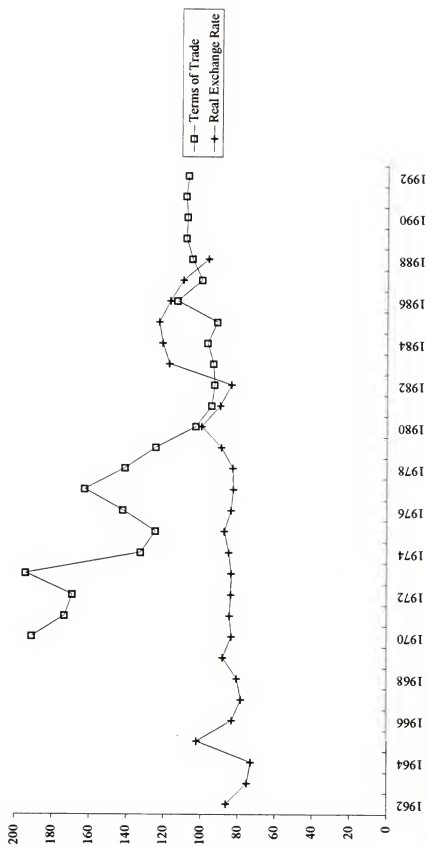
Source: World Bank, IMF, Latin American Center, Knight

Table 5.7  
Trade Position Indicators and Real Exchange Rate

	Terms of Trade Index (1987=100)	Trade Openness: XGS+MGS/ GDP	XGS/GDP	Real Exchange Rate 1980=100
1962				86.1
1963				74.9
1964				73.0
1965				102.1
1966				83.3
1967				78.4
1968				80.6
1969				88.2
1970	191	16.8	7.4	83.6
1971	173	16.9	6.8	84.6
1972	169	18.3	7.7	83.9
1973	194	20.5	8.9	83.7
1974	133	25.0	8.9	85.2
1975	125	21.7	8.0	87.5
1976	142	19.1	7.4	83.9
1977	163	18.2	7.7	82.8
1978	141	18.0	7.2	83.0
1979	124	20.7	8.0	89.3
1980	103	25.3	9.9	100.0
1981	95	25.0	10.2	90.0
1982	93	22.5	8.3	84.0
1983	94	27.4	12.0	117.5
1984	97	29.0	14.5	121.0
1985	92	26.5	13.1	123.0
1986	113	20.8	9.4	117.0
1987	100	20.1	9.8	110.0
1988	105	21.1	11.2	96.5
1989	109	17.1	8.6	
1990	108	16.1	7.6	
1991	109	18.4	8.8	
1992	108	19.7	10.4	

Source: World Bank, Goldin and Rezende, UN

Note: Real exchange rate calculated as the percentage ratio of US wholesale price index to Brazil wholesale price index, using average exchange index.



Source: World Bank, Goldin and Rezende

Figure 5.4  
Terms of Trade and Real Exchange Rate,  
Indices

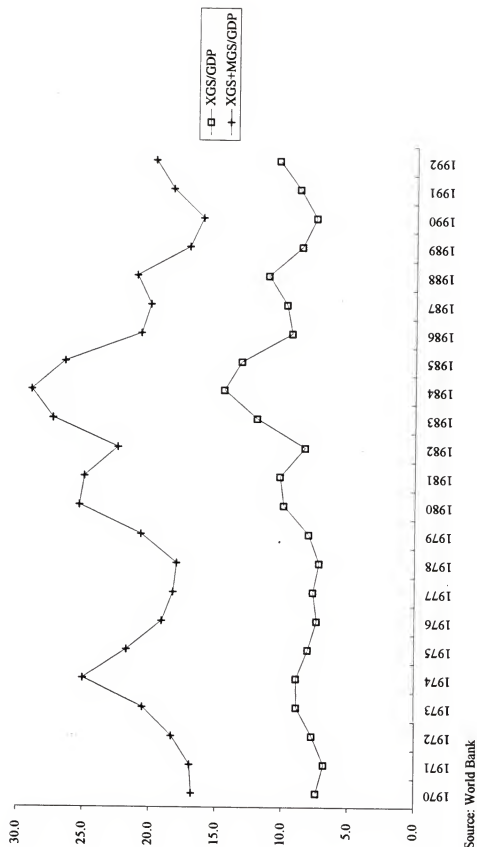


Figure 5.5  
Brazil Trade Openness Ratios

capital-intensive nature of industry and its decreased capacity for labor absorption<sup>20</sup>; and economic incentive programs which clearly favored the higher income groups (Von Doellinger 1975, Baer 1995). Large regional imbalances also continued, despite government incentive programs to attract economic development to poorer regions, notably the North and Northeast.<sup>21</sup> Incomes and industry were concentrated in the Southeast<sup>22</sup>, which in 1970 supported less than 43% of the population, but generated about 65% of income and 81% of industrial output in Brazil. Poverty and small-scale agriculture were concentrated in the Northeast (Bacha and Klein 1989).

Export promotion and ISI policies proved very successful in industrializing the country if not in reducing inequalities. However, while the pattern of external dependency was changed, dependency itself was not reduced (Cardoso 1980). Imports of consumer goods were reduced, but imports of intermediate and capital goods were substituted. Imported inputs were still required for the new industries, including capital equipment and fuel, and the new exports that were developed depended heavily on the policies and economic needs of industrial countries and on international markets, as the shocks of the 1970s revealed. In retrospect, the years of the Economic Miracle appear as a rare opportunity in Brazilian development to create structural change without domestic crisis. Instead, Brazil developed a heavy reliance on fossil fuels and imported inputs through the period (Cardoso 1980).

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<sup>20</sup> Clements finds that Brazilian trade policy has "generally had an adverse impact on income distribution and efficiency" (1988, p. 138) because of its promotion of capital-intensive production. He suggests that the poor get only a small share of the benefits from export promotion and ISI policies. His emphasis is on the manufacturing sector; however, the capitalization of agriculture seems to offer only negative benefits to many rural poor. These aspects of modernization are discussed below.

<sup>21</sup> Programs included tax incentives, SUDENE (the development agency for the Northeast), and programs for development of the Amazon.

<sup>22</sup> The regions (see figure 6.1) referred to in this chapter include the states as follows: Northeast: Maranhão, Ceará, Bahia, Piauí, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, and Sergipe; South: Santa Catarina, Rio Grande do Sul, Paraná; Southeast: Rio de Janeiro, São Paulo, Minas Gerais, Espírito Santo; Center-West: Mato Grosso, Mato Grosso do Sul (formerly part of Mato Grosso), Goiás, Tocantins (formerly part of Goiás); North: Rondônia, Amazonas, Acre, Pará, Roraima, and Amapá. Very roughly this regional assignment follows both economic and ecological divisions. Tocantins more appropriately belongs with the group of Northern (or Amazon) states but separate data on the state has only been available since 1989. The group of states labeled North constitutes much of the Legal Amazon.

Policies favoring capital-intensive investments aggravated income disparities while ensuring a continued reliance on imports.

### The Oil Shocks: 1974-1979

The oil price increases of the 1970s put substantial pressure on the Brazilian economy, given the country's heavy dependence on imported fuel (table 5.5), to support its large industrial sector and its growing trade deficit. Although GDP growth slowed in the latter half of the 1970s from its spectacular rates in the early part of the decade, growth continued at a respectable rate. Brazil successfully managed to avoid the recessionary impact of the 1973 oil price increase, largely by accumulating debt and restricting imports. Increased ISI efforts and dramatic increases in capital inflows, primarily publicly guaranteed loans, as well as strong commodity prices, allowed Brazil to maintain the levels of imports needed to sustain growth with little change in exchange-rate or trade regimes (Homem de Melo 1987a). Policy was geared to restructuring the economy to increase self-sufficiency and export capacity in industry and energy production (Batista 1993, Castro and Souza 1985). The rapidly rising debt, however, became increasingly difficult to manage and severely limited economic options when the 1979 rise in fuel prices and international interest rates shocked the Brazilian economy.

#### The First Oil Shock

Eighty percent of Brazil's oil was imported when the 1973 crisis occurred. Oil imports rose sharply as a share of imports in 1973 and 1974, and the import bill more than doubled. The trade deficit and the current account deficit both rose sharply in 1974 as a result. Inflation began to rise, doubling from 1973 to 1974, and continuing at over 30% a year until 1978, after years of relative stability.

Political changes have been blamed for precluding the option of allowing the higher fuel prices to work their way through the economy, that is, of allowing for recessionary adjustment (Lal and Maxfield 1993). The administration of Ernesto Geisel, which took office in 1974, aimed both to begin

a process of political *distensão* or "decompression"<sup>23</sup> and, in light of the worsening income distribution reported in the 1970 census, to improve the incomes of the poor. Both of these goals would have been threatened by economic recession. High growth required either an increase in the external debt or a substantial draw-down of accumulated reserves to pay the oil bill. Regardless of the political balance, the option of imposing recession on the economy, and possibly undoing the gains of the Miracle years, would have been unpalatable.<sup>24</sup> The rapid expansion of international capital markets provided an unprecedented opportunity for borrowing. But the concurrent increase in interest rate instability, largely a result of the collapse of the Bretton Woods system, eventually fuelled the debt crisis.

A few months of contractionary fiscal and monetary policies under the Geisel administration were followed by the introduction of the expansionary Second National Development Plan (II PND), covering 1975 to 1979. Essentially a huge investment program, the plan called for ISI in basic industrial inputs and an expansion of infrastructure to support industry<sup>25</sup>, to be carried out by both state and private enterprises. The investment program was intended as a countercyclical policy to maintain growth, employment, and consumption in the face of the oil crisis, and to encourage inflows of international capital that would obviate the need for painful economic adjustment. Large investments seemed justified on the grounds that import substitution and improved private sector performance would improve the long-term performance of the economy and provide the means for debt repayment (Bacha 1980, Batista

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<sup>23</sup> This process of government-led liberalization was begun when the moderate faction of the military gained the presidency under Geisel. Re-democratization culminated with the presidential elections of 1985 (Stepan 1989).

<sup>24</sup> Moreira (1986), Castro and Souza (1985), and Batista (1993) provide strong justifications for the government's choice of economic policies. Batista defends the policy choice of "growth-cum-debt," against Albert Fishlow's charge that the Brazilian state was too weak to impose adjustment. Bacha argues that "The external financing conditions in this period were so favorable that the alternative of furthering growth with external inputs imposed itself rather naturally." (Bacha 1980, p.32)

<sup>25</sup> Industrial expansion plans included steel, aluminum, fertilizers, and petrochemicals. Infrastructure projects included hydroelectric and nuclear power, alcohol production, transport, and communications projects.

1993, Castro and Souza 1985).<sup>26</sup> The remarkably easy access to foreign exchange through borrowing offered a unique opportunity for investment in development (Moreira 1986).

For the long-term, the investment policy was intended to create large-scale structural change in the economy, improving its domestic and export production capacity in major industries. Renewed import substitution along with export expansion and diversification provided the policy tools (Batista 1993, Castro and Souza 1985). Tariffs were raised, nearly doubling for intermediate and consumption goods, and import exemptions were reversed as part of the effort to re-initiate import substitution (Clements 1988). To reduce the fuel import bill, the Proalcool program to produce fuel from sugarcane was established, hydroelectric power supported, and oil exploitation expanded. These new energy industries were expected to lower imports and to provide cheap inputs for the basic industries, making them internationally competitive (Batista 1993).

Strong GDP growth continued through the 1970s, with an average for the decade of 7% annual growth, and industrial growth averaging 7.5% (Baer 1995). Through the latter half of the 1970s, import substitution bore more responsibility for the growth of industrial production than exports. Exports/GDP declined for the period, and imports were reduced, despite economic growth (Clements 1988) (table 5.7). Strong commodity prices kept terms of trade favorable through the decade, though below the levels of the early 1970s. Commercial policies, rather than exchange-rate policies, were used to influence trade, given that devaluation would have raised the cost of borrowing. Moreover, the reluctance to use exchange rate policy can be partly explained by unfavorable trends in the urban food supply (Homem de Melo 1987a). Devaluation would have further oriented production to the export sector.<sup>27</sup> The real exchange rate was held almost constant through the 1970s. The growth of exports through the 1970s and early 1980s was based primarily on the rapid growth of manufactures in the export basket (figure

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<sup>26</sup> Castro and Souza (1985) estimate that the foreign exchange return on investments was well above the expected cost of borrowing, despite allegations that much of the money was misspent.

<sup>27</sup> Sayad (1977) argued against devaluation on the basis of its potential effect on the urban food supply.



5.2). While basic exports--agriculture and mining--rose at just over 15% annually in the 1970s by value, manufactures rose at over 38% annually (Baer 1995). Despite favorable commodity prices (table 6.4), the quantity of basic exports remained fairly stagnant while the quantity of manufactures exports rose. That is, the falling share of basic exports was not due to poor terms of trade in the 1970s but rather to the failure to increase export quantity and to the rapid increase of manufactured exports.

### Debt Accumulation

Brazil's foreign debt rose substantially through the 1970s (table 5.8), primarily because of public sector borrowing. The apparently easy terms available on foreign lending with the flood of petrodollars on the market seemed to justify borrowing both to pay the oil bill and to support investment in industrial capacity. Although Brazilian international borrowing had already begun to rise in 1969, years before the oil crisis, until 1973 debt was associated for the most part with increasing reserves.<sup>28</sup> Both import substitution and encouragement of capital inflows (through loans and FDI) were used to improve the balance of payments. That is, investment was financed primarily with domestic resources. After 1973, the rising debt corresponded with a rising current account deficit (figure 5.5) (Nogueira Batista 1987).<sup>29</sup> Leff and Delfim Netto (1994) argue that exactly because of the income-creating effects of ISI and capital inflows they will not solve balance of payments problems.

Foreign capital was critical to continued high growth rates. As long as capital inflows could be maintained, the foreign exchange gap did not constrain growth (Batista 1993). Absorption of foreign real resources rose from 1.4% of GDP between 1970 and 1973 to 2.4% between 1974 and 1978, with

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<sup>28</sup> Between 1968 and 1973 foreign borrowing rose over 25% a year, from US\$ 3.3 billion in 1967 to US\$ 12.6 billion in 1973. Over this period two-thirds of the foreign debt went to create reserves; net foreign debt only doubled, rising from US\$ 3.1 billion in 1967 to US \$ 6.2 billion in 1973 (Nogueira Batista 1987).

<sup>29</sup> Net debt rose at almost 39% a year between 1973 and 1978 (Baer 1995). Gross debt rose from US\$ 14.7 billion in 1973 to US\$ 53.8 billion (table 5.8). The current account deficit increased with debt service payments, and was aggravated by FDI profit remittances and increased prices for foreign shipping.

Table 5.8  
Debt indicators  
(US \$ billions)

Year	Outstanding External Debt, total (US\$)	TDS/XGS (%)	Total Long-Term Debt	Public and publicly guaranteed debt
1964				
1965				
1966				
1967				
1968				
1969				
1970	5.79		5.08	3.37
1971	7.50	26	6.58	4.15
1972	11.54	26	10.12	5.88
1973	14.70	27	12.90	7.75
1974	22.08	36	19.38	11.20
1975	27.03	43	23.72	14.13
1976	33.06	38	29.02	17.89
1977	41.40	42	35.40	22.39
1978	53.82	57	46.74	30.59
1979	60.69	63	52.04	36.18
1980	71.01	63	57.47	40.86
1981	80.97	66	65.60	45.81
1982	92.96	81	74.88	51.76
1983	98.34	55	81.34	59.83
1984	105.40	46	90.08	70.78
1985	106.12	39	91.88	74.71
1986	113.70	47	99.52	84.88
1987	123.84	42	106.20	91.77
1988	115.71	48	101.46	89.95
1989	111.37	40	90.37	84.36
1990	116.42	24	90.43	83.76
1991	117.35	24	89.13	81.48
1992	121.11	24	99.25	86.25

Source: World Bank

Note: TDS is total debt service; XGS is exports of goods and services.

an increasing share in gross capital formation. After 1973 FDI inflows increased too. The debt was becoming a substantial burden to the Brazilian economy several years before the debt crisis received international attention. By 1978, more than half of Brazil's exports were needed to cover the country's debt service payments (table 5.8).

### The Second Oil Shock

The last military president, General João Batista de Oliveira Figueiredo, took office in 1979 faced by the conflicting goals of controlling rising inflation and the debt, and promoting growth. A series of interrelated international economic shocks greatly aggravated the economic situation. The second oil shock worsened terms of trade, raising the import bill, while falling commodity prices reduced export revenues. International interest rates rose dramatically as the US responded to the crisis with tight monetary policies. Given that much of Brazil's debt had been contracted under flexible rates, Brazil, along with much of the developing world, now faced not only higher rates on new money but also increasing debt service on old loans. Poor harvests in 1978 and 1979 meant that Brazil had to increase imports of staple food crops. As fuel and food prices rose, inflation doubled from 1978 to 1979. Adjustment becomes essential just when circumstances make it most difficult.

At this juncture, when Brazil most needed to increase exports to improve its external accounts, international pressure for the removal of fiscal and credit subsidies to exports intensified (Clements 1988). Elimination of these incentives to exports was phased in beginning in 1980. Devaluation of the cruzeiro remained as the primary policy tool for export promotion. The real exchange rate had remained fairly constant through the 1970s, despite variations in terms of trade. Devaluations had been avoidable, despite frequent overvaluation related to inflation, in large part because subsidies and incentives had compensated exporters for the damage done by overvaluation. While inflation bore responsibility for frequent overvaluation, devaluation of the cruzeiro was also problematic because of its inflationary

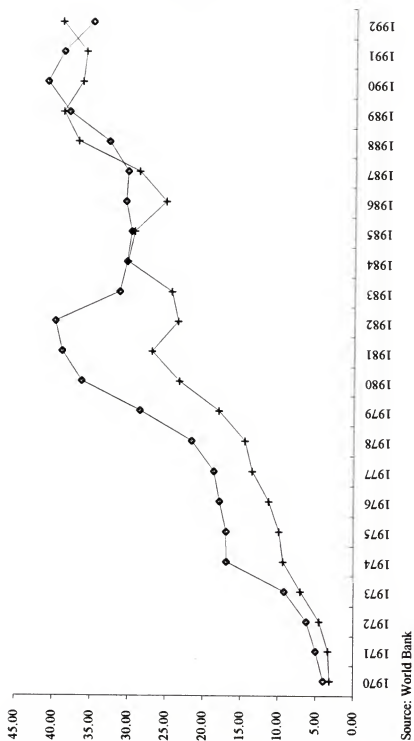


Figure 5.6  
Exports and Imports  
of Goods and Services

impacts.<sup>30</sup> Devaluation raised both import prices and foreign debt service, which Brazil could ill-afford as terms of trade worsened.

After a brief attempt to implement an orthodox (recessionary) response to the shock<sup>31</sup>, the unpopularity of these policies led to a policy reversal in mid-1979. Antonio Delfim Netto, who had presided over the Miracle, was appointed as Planning Minister. He attempted to repeat the expansionary approach that had provided a successful response to the first oil shock. Expansion in energy and agriculture, and low prices on public sector goods, i.e. provision of "cheap" resources, were expected to boost exports and lower inflationary food costs. However, international conditions had changed completely (Batista 1993, Martone 1987).

When growth-oriented policies failed to resolve the economic problems, a new economic package was introduced in late 1979. The package focused on reshaping trade and improving the current account balance. It included a devaluation of 30%; the elimination of many export incentives<sup>32</sup>; and the removal of some barriers to imports. The devaluation, in conjunction with limits on the monetary correction index, was intended to lower inflationary pressures.<sup>33</sup> Credit restraints on the industrial and commercial sectors were intended to induce firms to increase foreign borrowing.<sup>34</sup> Full funding was maintained for agricultural credit in order to reduce food import requirements and maintain industrial

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<sup>30</sup> Devaluation will increase inflationary pressures if it does not induce a decrease in imports.

<sup>31</sup> Devaluations were stepped up, and tighter fiscal and monetary policies adopted in order to slow growth, reduce inflation and improve the balance of payments under Planning Minister Mario Henrique Simonsen in the early months of the new Figueiredo administration.

<sup>32</sup> The *crédito prêmio* was eliminated and other credit subsidies were substantially reduced. Export incentives for manufactures fell from 62.08% of FOB value in 1979 to 36.98% in 1980. The *crédito prêmio* and financing subsidies were restored in 1981, but overall the role of subsidies (as opposed to tax exemptions) fell through the 1980s. Export incentives stood at 43.4% of FOB value in 1985 (Clements 1988).

<sup>33</sup> The devaluation also served to partially compensate exporters for the reduction in incentives.

<sup>34</sup> Assuring the continued inflow of new money appeared as a way to meet increasing debt service requirements. This approach continued in many countries through the debt crisis.

supplies of raw materials. Agricultural resources provided a cheap basis for earning and saving foreign exchange.

The external adjustment which had been avoided in the 1970s was forced on Brazil at the end of the decade. The price was domestic crisis. Full indexation<sup>35</sup> was reintroduced as inflation reached 110% in 1980. Inflation made the real effects of devaluation difficult to maintain; the gains from the 1979 real devaluation were soon lost. Nevertheless exports increased enough to hold the trade deficit at the 1979 level despite rising import costs.<sup>36</sup> Brazil had sheltered itself from many trade pressures in the 1960s and 1970s. The debt accumulated in the 1970s, however, especially in conjunction with strong international pressure for economic liberalization, made continued isolation from international markets impossible.

#### The Debt Crisis and Recession: 1980-86

The Brazilian economy was crippled by the debt crisis through the early 1980s. GDP growth was negative for several years and debt service caused a large-scale transfer of real resources out of Brazil beginning in 1982 (Batista 1993). Brazil's efforts to deal with its debt obligations produced a reversal of the trade balance in 1981. The trade balance remained strongly positive into the 1990s, as real resource exports have covered debt obligations.

A new macroeconomic strategy was introduced in late 1980 as the deficit became increasingly difficult to finance. The new strategy has been described as Brazil's own version of an IMF stabilization program, implemented to forestall IMF involvement (Lal and Maxfield 1993). In other words, the program aimed to reduce imports and stimulate exports to finance the foreign exchange gap, and

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<sup>35</sup> Under full indexation, wages and financial instruments were tied to the inflation index, in order to prevent economic stagnation by preventing losses to inflation, but also ensuring that price increases were felt through the entire economy. In the early 1970s indexation appeared to have primarily positive results, but as inflation rose in the mid-1970s indexation fueled inflation.

<sup>36</sup> Exports rose from US\$ 15.2 billion in 1979 to US\$ 20.1 billion in 1980 based on expansion of both primary products and manufactures; imports rose from US\$ 19.7 to US\$ 24.9, largely because of rising fuel costs (tables 5.4, 5.5).

introduced strict monetary policies to control inflation. Managing external accounts necessarily took economic priority. Policy measures, particularly controls on imports, were intended to reduce aggregate demand and reallocate resources to priority areas such as agriculture and exports.

The contractionary impact on GDP is clear. But the domestic austerity program proved ineffective in controlling domestic inflation. Moreover, the problem of rising foreign debt was not resolved; new capital inflows were constantly required to make payments on old debt. Debt service was absorbing almost all export earnings, with the interest alone accounting for over half of export earnings, when the Mexican moratorium brought an end to the lending boom in 1982. The debt crisis that officially began in 1982 was already well underway in Brazil. Under the new international conditions, even the most orthodox of macroeconomic policies could not attract the new loans required to service the mounting debt.

#### IMF Programs

Brazil entered into a series of IMF austerity programs in 1983 and 1984. Although most IMF targets were never met<sup>37</sup> and inflation continued at high levels, Brazil was successful in strengthening its new trade surplus, and opened the possibility of exporting its way to economic recovery. The economic recovery in 1984 and 1985 was closely tied to the expansion of exports, facilitated by improvements in international markets (Martone 1987). The problems with this contractionary IMF-style approach to the external imbalance have been widely discussed.<sup>38</sup> Very briefly, internal economic problems were aggravated rather than resolved by efforts to adjust externally. Inflation continued to rise while interest rates discouraged investment. The increasing interest on foreign debt caused by the

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<sup>37</sup> The IMF programs focussed on raising the real exchange rate; reducing domestic demand by lowering consumption, investment, and public spending; and increasing taxes. Seven letters of intent were signed over the two years, reflecting the rocky relations between the IMF and Brazil (Moreira 1986, Dinsmoor 1990).

<sup>38</sup> See for example, Lele (1992), Haggard and Kaufman (1992).

devaluation washed out gains made in the trade balance. By the mid-1980s there was little hope of controlling government expenditures through the operational budget<sup>39</sup> as indexation, rising public sector debt, and rising interest rates (in part a result of increased government borrowing) increased government deficits.<sup>40</sup> Moreover, the burden of the adjustment fell most heavily, as it usually does, on lower income groups. The 1980 census again showed increased income concentration; improvements in labor incomes achieved through wage policies in the late 1970s were lost. GDP, especially industrial GDP, fell. Eventually Brazil turned to heterodox programs to address the domestic problems that IMF orthodox policies had not resolved.

### Changes in Trade Patterns

The structure of trade was significantly altered by the debt crisis and the policy response (tables 5.4, 5.5; figure 5.1). There was a pronounced opening for exports while imports declined from 10.6% of GDP in 1980 to 5.8% in 1986. The 1980s also saw decline in industrial growth. Subsidies had provided a relatively painless instrument for export promotion; devaluation did not (Clements 1988).

A decrease in imports was achieved through demand suppression, import substitution, and an increase in domestic fuel production (through both increased petroleum production and the Proalcool import-substitution program). Special credits for exports and ISI industries were reintroduced. Another maxi-devaluation of the cruzeiro, 30%, was allowed in early 1983, and active use of the exchange rate to shift resources to the export sector continued thereafter (Martone 1987). The large fall in imports associated with the recession and later with ISI created a substantial trade surplus beginning in 1983.

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<sup>39</sup> The operational budget covers current revenues and spending obligations, not accumulated debt and debt service obligations. The portion of government expenditures outside of the operational budget has been known as the Public Sector Borrowing Requirement (PSBR), i.e. the government debt which was indexed to inflation, and was one of the main sources of dispute with the IMF.

<sup>40</sup> Much of the contractionary impact was borne by the public sector. Public-sector enterprise prices were often used as a means to dampen inflation, which reduced their ability to cover expenses. With falling taxes and rising expenses in the recession of the early 1980s, large cuts were made in public-sector enterprise expenditures (Baer 1995, Moreira 1986).



The strong response of the trade balance to the debt crisis has been attributed alternatively to IMF-style orthodox policies promoting exports and demand suppression (Dinsmoor 1990), and to the success of government-financed structural change in the 1970s, which created a manufacturing sector capable of expanding exports rapidly (Batista 1993, Castro and Souza 1985).<sup>41</sup>

The transfer or export of real resources to pay the debt bill through the 1980s came at the cost of low investment rates<sup>42</sup>, and probably of domestic development. Cheap resources provided by the public and domestic sectors lie behind the large export surpluses (Batista 1993, Moreira 1986), provided partly in the form of cheap energy and land, as well as through monetary expansion. The cost was continued inflation, falling incomes, and export of real resources. The need to increase competitiveness in tradeables goods required a decrease in the relative price of non-traded goods, that is, a devaluing of domestic resources. Teitel and Thouni (1986) attribute Brazil's successful development of a manufactures export sector to the exploitation of cheap natural resources by industry. Agricultural exports are clearly based on such exploitation.

During the 1970s, commodity exports were given little support as government policy focused on changing the industrial structure and reducing fuel imports. As long as capital inflows continued it was possible to be lax about these exports, but with the debt crisis they gained renewed importance. Exports led the GDP recovery of 1984 and 1985 (Dinsmoor 1990). However, prices for all of Brazil's major agricultural exports fell in the early 1980s as world trade shrank. Increasing volumes of exports were needed just to maintain export income as terms of trade worsened. Brazil's success in increasing income from exports reflects a substantial increase in the physical quantity of exports. Like most of Latin America, Brazil also reduced its agricultural imports, including both food imports and agricultural inputs (Chapters 6 and 7).

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<sup>41</sup> Moreira (1986) argues that the structural change effected by the 1970s investments increased the share of exports in GDP, which rose over 10% in the mid-1980s.

<sup>42</sup> Martone (1987) points out the high correlation between the import coefficient and domestic investment.

### The Heterodox Plans and Economic Stagnation: 1986-1992

Since the return to civilian government in 1985 under President José Sarney, a long series of primarily heterodox shock programs have been implemented in an effort to control Brazil's inflation and restore economic growth. Though each program achieved a reduction in inflation the effects were always short-lived. Economic stagnation combined with inflation dragged on from the failure of the first shock program in 1986 under Sarney through Fernando Collor de Mello's impeachment in late 1992. Constant battles with high inflation reflect the incompatibility of efforts to maintain growth and the trade surplus on the one hand, and deflationary policies on the other (Batista 1993). Real GDP growth averaged only 0.6% from 1987 through 1992, with three- and four-digit inflation every year. GDP per capita fell through the period and income distribution worsened (Baer 1995). The trade balance remained strong and debt service fell as a share of exports, but the debt burden continued to rise (table 5.8).

#### Sarney's Administration

The Cruzado Plan, implemented in early 1986, was the first heterodox effort, consisting of both fiscal and monetary constraints and a price- and wage-freeze to eliminate inertial inflation.<sup>43</sup> Inflation fell to less than 1% per month initially (Smith 1989) without apparent recessionary effects, winning the

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<sup>43</sup> Components of the Cruzado Plan included a general freeze on final goods prices; a wage increase with a freeze at the new level; prohibition of indexing on short-term contracts; and creation of a new currency, the Cruzado (equal to 1,000 cruzeiros) (see Arida 1986, Lopes 1986).

There are essentially two explanations of chronic inflation problems. The monetary explanation (espoused by the IMF) blames the fiscal deficit and accumulation of foreign exchange reserves. Control of inflation depends on economic instruments, namely tight monetary policy and fiscal balance. The neo-structuralist explanation (Bresser Pereira and Nakano 1984, Lopes 1986), which is better fitted to the Brazilian situation of the 1980s, stresses the inertial nature of inflation which continues even when orthodox adjustments have been made. Baer, for example, explains Brazil's inflation in terms of a continual fight for economic shares which is aggravated by external shocks. Producers are able to rapidly pass on cost increases, such as rising fuel prices or interest rates, to product prices, while labor is able to claim income compensation for rising prices through indexation and monetary expansion, leading to a spiraling of prices upward.

A heterodox program including price controls as well as orthodox measures is needed to slow inflation. Heterodox programs are preferred to orthodox plans on the grounds that they control inertial inflation without inducing recession and unemployment. Heterodox plans try to ignore the conflict between inflation control and growth while orthodox plans often ignore the structural component of inflation and the costs of recession.

plan enormous popularity. GDP growth accelerated rapidly under the Cruzado Plan, based on consumer spending. However, problems became evident as demand at the frozen prices outstripped supply and price evasion spread. Inflation was on the rise again before the end of the year, external accounts had worsened, and growth was falling.<sup>44</sup> Attempts to deal with some of these problems in July 1986 (the little Cruzado Plan) and the Cruzado II package of November 1986, both intended to reduce demand in the overheated economy through orthodox measures, failed. Price increases only diverted consumption, rather than reducing it (Smith 1989).

Brazil's external position at the start of the Cruzado Plan was fairly strong, with a balance of trade surplus maintained since 1983. The exchange rate was favorable to exports, and the accumulation of foreign reserves was offsetting the rising debt obligation. Under the Plan, the exchange rate was fixed, which led to overvaluation as inflation began to rise. By mid-1986, overvaluation led to falling exports and a worsening balance of payments position. The collapse of debt negotiations in 1985 and Brazil's refusal to accept new IMF programs meant that no new credit facilities were negotiated with commercial banks in 1985 or 1986; problems also arose with the Paris Club. Foreign direct investment vanished (Dinsmoor 1990). The contradiction between domestic growth, which reached 8% for 1985 and 1986, and international balance was felt as international reserves fell by about half and the trade surplus shrank. Once reserves had been lost, Brazil declared a debt moratorium in February 1987. The

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<sup>44</sup> Various explanations of the failure of the Cruzado Plan have been offered, beginning with the suggestion that its initial diagnosis of inertial inflation may have been wrong. The extent of indexation and inflationary expectations in the Brazilian economy, however, make this criticism suspect. Smith (1989) suggests that the orthodox portions of the program were never properly implemented. Most criticisms (Baer 1995) point to the lack of fiscal control and the continuing public sector deficits, and to the expansionary monetary policy which lowered interest rates and boosted consumption. The apparent success of the heterodox shock temporarily freed Sarney from implementing the more painful portions of the program. Sarney was also preoccupied with political lobbying to extend his term (Pang 1989, Haggard and Kaufman 1992), a concern which steered him away from unpopular orthodox measures. The freeze was maintained well beyond its economic usefulness because of its political popularity. The strong balance of trade created additional inflationary pressures as the cruzado became overvalued and speculation against the cruzado increased. Baer, however, places most of the blame for the Plan's failure on the wage increase implemented with the shock, which inevitably created a strong inflationary pressure.

crawling peg exchange rate was reintroduced, and in mid-1987 new IMF missions were accepted, but not before inflation had reached an annual rate of over 1,000% (Dinsmoor 1990).

Increasingly the government deficit became a major factor underlying chronic inflation. The government's developmentalist role was precluded by the obstacle that increasing public sector debt created to growth-promotion and inflation control.<sup>45</sup> While policy-makers in the later years of the Sarney administration recognized the need to control the government deficit, fiscal readjustment appeared politically infeasible. Government deficits created a vicious circle of rising interest rates, monetary expansion, rising inflation, and rising government debts.<sup>46</sup>

Two more shock programs were implemented under the Sarney administration, the Bresser Plan of 1987 (named for the finance minister) and the Plano Verão (Summer Plan) of 1989. Both plans tried to improve on the Cruzado Plans by preventing excess consumption and a rise in imports by maintaining positive interest rates. Both aimed to control the public deficit, especially public-sector enterprise deficits, in order to control inflation and prevent overvaluation that would hurt exports. Yet, despite brief successes in controlling inflation<sup>47</sup>, the budget deficit was not reduced.<sup>48</sup> Between these last two shock plans, a gradualist approach of austerity measures was attempted in the fight against inflation. Slowing in public sector price increases and in the exchange rate devaluation meant that inflation was fought mainly at the cost of the public-sector enterprises and government resources and loss of exports.

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<sup>45</sup> The Constitution of 1988 increased the difficulty of controlling the federal budget by transferring fiscal resources to the state and municipal governments without reducing the federal government's responsibilities (Baer 1995).

<sup>46</sup> The financial sector served increasingly to transfer savings to the public sector. The financial sector share of GDP rose from 8.5% in 1980 to 19% in 1989 (Baer 1995).

<sup>47</sup> Under the Bresser Plan, inflation fell to 4.5% for the month of August, but reached two-digits again by October 1987. Under the Plano Verão, inflation fell from 36.6% in January 1989 to 4.25% in March, but reached 37.9% by March 1990 when Collor took office.

<sup>48</sup> Factors behind the continued growth of government spending included salary increases, the transfer of funds to indebted state and municipal governments, and growing subsidies to state enterprises. Sarney's political ambitions probably played a role in the failure to control this spending.

Inflation growth was slowed but not controlled by this approach, and reached 28% per month in late 1988 before the Plano Verão was implemented.

### Liberalization

Under Sarney, the government began a liberalization process for the external sector which has continued through the early 1990s. In addition to the elimination to a number of policy interventions in the import and export sectors, tariffs were gradually lowered. The average unweighted tariff fell from 51% to 21% between 1987 and 1992; the tariff range was reduced from 0-105% to 0-65% and the number of tariff lines covered by quantitative restrictions was reduced from 39 to virtually none (Alam and Rajapatirana 1993).<sup>49</sup> Although liberalization was begun under Sarney, the reorientation of trade policy toward meeting external obligations, rather than fulfilling domestic import requirements, had already been forced by the debt crisis. The move toward more liberal and less state-centrist thinking became more pronounced under Collor.

### Collor's Administration and Beyond

Collor assumed the presidency in 1990, and implemented further liberalization measures to meet external obligations and yet another shock program (Collor I) to control inflation. In addition to a price and wage freeze, the economic plan included a freeze on most deposits, which drastically reduced liquidity. Liberalization measures included the elimination of various fiscal incentives, for imports, exports, agriculture, regional development, and some industrial sectors, and the introduction of a privatization program. The exchange rate was also liberalized. Inflation fell rapidly but so did GDP. Because Congress did not support the policies for structural change, including fiscal adjustment, the

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<sup>49</sup> Alam and Rajapatirana (1993) point to an increase in economic openness as a result in this period, which is not supported by other World Bank data.

effectiveness of the program was limited. Assets were soon unfrozen<sup>50</sup>, and although GDP growth recovered with the release of assets, strongly negative growth was registered for 1990.

The Collor II Plan of 1991 was introduced in the face of accelerating inflation and increasing difficulty in financing the deficit. This package focused on financial reforms, as well as including a short-lived price and wage freeze. Real GDP growth was restored, though barely, in 1991. Most important for fiscal improvement, the domestic public-debt expenditures were substantially reduced through under-indexation (Baer 1995). Yet monetary expansion largely offset fiscal control and speculation against the Cruzado led to a devaluation of 14% in October 1991. The fiscal situation worsened in 1992, reflecting tax shortfalls and rising obligations; real GDP fell by 1% for the year.

Itamar Franco, who assumed the presidency after Collor's impeachment, eventually appointed Fernando Henrique Cardoso as Finance Minister.<sup>51</sup> Cardoso's stabilization policies appear to have been more successful, or at least longer-lived, than any of the previous stabilization programs. Following the Immediate Action Plan of June 1993, which cut government spending, improved tax collection, and called for improved financial relations between the federal and state governments<sup>52</sup>, the Plano Real of December 1993 aimed for fiscal adjustment and a new indexing system to lead to a new currency (the Real). Measures included tax increases, a new Social Emergency Fund<sup>53</sup>, and cuts in government spending on investment, personnel, and public-sector enterprises, and a restrictive monetary policy with high interest rates to control consumption. Cardoso was elected president on the basis of the Plan's

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<sup>50</sup> Assets were unfrozen in an ad hoc, disorderly manner because of political pressures and fear of recession, which added further uncertainty to the economy.

<sup>51</sup> The first year of Franco's administration was distinguished by the lack of economic leadership. Four different economic staffs were appointed during the year (Baer 1995).

<sup>52</sup> The state governments owe substantial amounts to the federal government.

<sup>53</sup> The Fund was designed as a temporary measure to be phased out when responsibilities for many social services are constitutionally transferred to state and municipal governments.

success. Inflation has been brought down sharply and held at reasonable levels, but at the cost of tight credit and a worsening trade balance.

### Trade

Exports and the external sector fared surprisingly well, given the internal disruptions of the late 1980s. Exports grew at 7.6% annually from 1987 to 1992, facilitated by domestic recession<sup>54</sup> and by a competitive exchange rate maintained through frequent devaluations. Imports stagnated until 1989, and then rose substantially under Collor's program of liberalization. When the exchange rate appreciated in late 1990, the government intervened to limit overvaluation. Liberalization combined with this overvaluation and the elimination of export incentives led to a drop in exports in 1990. Imports increased as a result of the overvaluation and the oil price rise induced by the Gulf War. From 1987 to 1992 exports expanded from US\$ 26 billion to almost US\$ 36 billion; imports rose from US\$ 16.5 billion to US\$ 23 billion. An average trade surplus of US\$ 14 billion (Alam and Rajapatirana 1993) was substantially above the levels of the early 1980s. The capital account also improved as interest rates fell and arrears accumulated; foreign direct investment has increased in the 1990s and profit remittances have slowed. As progress was finally made in the debt negotiations, long-term loans began to flow in the late 1980s and early 1990s.

Manufactures have risen dramatically as a share of exports over the past forty years, from 1% of exports in 1955 to 58% in 1992. The most rapid expansion occurred in the Miracle years, with the share rising from 5% in 1964 to 26% in 1974. Primary products have shown the reverse of this pattern, with the share falling from 99% in 1955 to 40% in 1992. Coffee exports in particular have seen a very sharp decline, from 56% of exports in 1960 to 11% in 1974 to a mere 3% in 1992. Other primary products have increased their share but none have occupied the former position of coffee. Even

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<sup>54</sup> Exports fell only in 1986 when the Cruzado Plan temporarily fixed the exchange rate and increased domestic consumption.

soybeans, which have expanded dramatically, peaked at 16% of exports in 1976 and had fallen to 7.5% in 1992 (Baer 1995). Sugar peaked at 13% in 1974 and had fallen to less than 2% in 1992.

These figures on shares of exports reveal something about the relative importance of primary products to Brazil's export earnings. However, concealed by these numbers is the fact that in both quantitative and value terms agricultural exports have expanded dramatically in recent decades. Moreover, agriculture has played a critical role in Brazil's import-substitution and industrial expansion efforts. Land use for agriculture and pasture has expanded rapidly. Chapter 6 explores this role of agriculture.



## CHAPTER 6

### AGRICULTURE: POLICY AND MACROECONOMIC FACTORS

Policy choices in the face of international trade and foreign exchange constraints and domestic pressures for development have altered the structure of agricultural production and land use in all aspects in Brazil, from selection of crops to modernization patterns to frontier expansion.<sup>1</sup> Agricultural land-use patterns have been shaped by macroeconomic events and policies through both direct effects on the agricultural sector, and thence on land use, and effects filtered through sectoral policies. Domestic agricultural policies have been widely used, on the one hand, to support macroeconomic policies designed to increase growth, expand the availability of foreign exchange, and stabilize the economy, playing a vital role in meeting both external and domestic needs. On the other hand, intervention has been used to mitigate the detrimental impact of economic and trade policies and pressures on the agricultural sector. Incentives and support for different types of crops--exports, foodstuffs, industrial inputs--have evolved over the last thirty years, and both planting and productivity patterns have been directly affected. The trade-off between traditional food crops and tradeable crops and the scale of production have been dictated by both external and internal trade factors and by related government policy. These impacts are explored here.

Overall, the Brazilian agricultural sector has performed well in terms of growth. Although agriculture did not grow as rapidly as industry through much of the period, its growth was not slow, and it outperformed the industrial sector in the crises of the 1980s. Agriculture has made a substantial

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<sup>1</sup> This chapter draws on Baer (1989, 1995), Barkin et al. (1991), Brandão and Carvalho (1991a, 1991b), Goldin and Rezende (1990), Graham et al. (1987), Grindle (1986), Homem de Melo (1983, 1987a, 1987b), Rezende (1991), and World Bank (1982, 1990, 1994).

contribution to the development goals of the government by providing foreign exchange and cheap food, raw materials, and labor to the industrial and service sectors (World Bank 1982). Agricultural production expanded consistently, at 4.5% a year between 1950 and 1965, at 5% a year between 1965 and 1980, and at 2.8% in the 1980s (IBGE). Substantial structural change has taken place in the sector, despite a heavy reliance on expansion of land area for production increases. Agriculture is now much more capital- and input-intensive, and much less labor absorptive, than it was in the 1950s and 1960s (Sanders and Ruttan 1978, Rezende 1991, Martine and Garcia 1987). The crop mix has changed, and links with processing industries have grown. The impressive expansion of land in agricultural use is a result of both the push to increase production and changes in production methods.

The analysis in this chapter and Chapter 7 will consider some indicative crops, some in more detail than others; they include beans, cotton, coffee, corn, cassava, cacao, wheat, rice, soybeans, oranges, and sugar. These crops have been selected both because of their importance in the Brazilian economy and because of their usefulness in examining the trade-land-use connection. As of 1980 these crops accounted for about 98% of area harvested (Brandão and Carvalho 1991a). Cattle and pasture land are also considered. These crops are broken into three groups--those which are largely exported, those which are import-substitutes, and those which are generally not traded. Traditional exports include coffee, cotton, cacao, and sugar. Non-traditional exports include soybeans and oranges. Sugar is also an import substitute, along with wheat. Cassava, rice, beans, and corn are the traditional Brazilian staples. Cassava and beans are particularly important among low income groups, while rice and corn are more important to higher income groups (Barkin et al. 1991). A long history of government preference for export agriculture is evident in the predominance of modern export operations and in the relegation of domestic crops to small farms and marginal lands (Barkin et al. 1991). Roughly speaking, inward-looking policies have favored domestic food crops while outward-looking policies have favored

export and import-substitute crops. However, as modernization and industrialization have proceeded, the distinction between the groups has become increasingly blurred.

Domestic policies for agriculture, like all government policies, have roots in a variety of political intentions, and often have unintended effects, including the environmental effects of concern here. Yet in large part, Brazilian agricultural sector policies represent an effort to mitigate or respond to external pressures. Policies reflect current views on the potential of agricultural exports and imports in promoting development. The following sections will discuss the role of macroeconomic events and policies and the role of sectoral policies in shaping the agricultural sector. The focus is on the implications for expansion (or contraction) and intensification or modernization of production in Brazil's primary agricultural crops, those changes with clear land-use implications.

#### Establishment of the Anti-Agricultural Bias: Import Substitution of the 1950s

The ISI policies of the 1950s, in their effort to boost industrial self-sufficiency, ignored the agricultural sector for the most part. Nevertheless, agricultural production expanded substantially<sup>2</sup> through incorporation of land and labor (Goodman 1989). As was the case in Mexico and Argentina, agriculture had lost its position as the leading sector of the economy in the 1940s as the industrial sector expanded under the import constraints of World War II and post-War ISI policies (see Chapter 4). The policy norm for Brazil and much of Latin America discriminated against agriculture and against exports.<sup>3</sup> Support for industrialization turned internal terms of trade against agriculture, transferring resources to the urban and industrial sectors (Goodman 1989). An elaborate system of exchange rates also discriminated against traditional commodity exports.

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<sup>2</sup> Most expansion occurred in coffee production, which experienced a 70% increase in land area between 1950 and 1962 and a quadrupling of tonnage produced (Baer 1995), based mainly on high world prices.

<sup>3</sup> The frequent changes in policies may have been more damaging to agriculture than the ISI policies themselves (World Bank 1982).

Policies were based on the view that low urban wages, made possible by low food prices, would facilitate ISI and attract foreign capital while continued exports of traditional commodities would fund the necessary imports and debt service. Agriculture was expected to provide resources to domestic and external markets. However, the common structuralist view held that agricultural supply was unresponsive to prices, either export prices or urban demand, because of the predominance of large, inefficient farms.<sup>4</sup> The argument held that price controls were therefore necessary to prevent price increases, which otherwise would lead to wage increases and inflation as urban food demand expanded. The development side of the argument proposed exports as an engine of growth, supporting industrialization insofar as exports exceeded imports of consumer goods (e.g., Lewis 1984). Theoretical debate in development economics alternatively viewed trade in commodities as an engine of growth and a reinforcer of dependency (see Chapters 3 and 4). While ISI policies held relief from dependence on commodity exports and foreign manufactured goods as a long-term goal, investment in industrialization inevitably entailed reliance on traditional exports. ISI policies necessarily accepted commodity exports as the only reliable source of foreign exchange, but promoted structural change that would reduce dependence in the long-run. In view of the apparent inelasticity of agricultural supply, ISI policies did not emphasize market incentives to production or export.

Massive industrialization and urbanization did create growing urban demand for foodstuffs and raw materials in the 1950s. Domestic consumption crops expanded to meet this rising urban demand.<sup>5</sup> Increases in production for export were negligible in the late 1950s, apart from the coffee boom. Although traditional exports (primarily coffee, cotton, and cacao) were expected to provide the foreign exchange needed for industrial development (Brandão and Carvalho 1991a), the sector received little

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<sup>4</sup> This was the position taken by ECLA. Goodman and Redclift (1977) provide a review of this argument.

<sup>5</sup> Area cultivated for rice rose by 6.5% between 1955 and 1965; cassava by 4.7%; and black beans by 4.2% (Baer 1995).

support, given the policy emphasis on reducing import requirements and the expectation of poor supply response.

Brazil did not subsidize agriculture heavily to achieve its cheap food policy. State support for agriculture before the military regime (1964-1985) was limited to marketing and infrastructure development intended to facilitate commercialization (Brandão and Carvalho 1991a). Agricultural growth in the 1950s was closely tied to government road construction in particular. Between 1952 and 1965 the road network expanded by two and a half times<sup>6</sup> and the use of railroads, highways, and shipping expanded rapidly, which served to lower food prices (Grindle 1986). Investments were also made in storage facilities. Modernization was given some support through favorable terms for imported agricultural inputs. Primarily, the sector served as a source of resources for the urban and industrial sectors. As long as capital investment in the sector remained low and productivity increases came through expansion of area, savings could be transferred out of the sector. The extensive development of agriculture through incorporation of new land, rather than increased productivity, was actively supported by this infrastructure development (Goodman 1989). Terms of trade began to favor agriculture, both food and export crops, by the early 1960s, in part because of slow growth in production in the early 1960s (Homem de Melo 1987a). The rise in real food prices, however, increased inflation pressures (Goodman 1989) as the civilian regime collapsed.

#### The Military Regime and Export Promotion: 1964-1978

The opening of the economy in the 1960s, particularly liberalization of exports, changed the role of agricultural production in the economy substantially. Production for export expanded as the ISI bias against agriculture diminished and agricultural processing industries received incentives. The

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<sup>6</sup> Federal highways expanded from 12.3 thousand km to 32.4 thousand km between 1952 and 1960 alone. The 1950s saw a four-fold increase in the volume of commodities transported by truck (Baer 1995).

Table 6.1  
Exports of Natural-Resource-Based products

Year	Total Merchandise Exports (US\$ millions)	Agriculture, Fish & Forestry Exports (US\$ millions)	as % of total:	Agricultural Products Exports (US\$ millions)	as % of total:	Index of Agricultural Exports (volume) 1975=100
1961	1,403	1,225	87%	1,170	83%	24
1962	1,214	1,062	87%	1,015	84%	21
1963	1,407	1,251	89%	1,205	86%	25
1964	1,430	1,237	86%	1,175	82%	24
1965	1,596	1,312	82%	1,233	77%	25
1966	1,741	1,471	84%	1,387	80%	29
1967	1,654	1,353	82%	1,277	77%	26
1968	1,881	1,584	84%	1,477	78%	31
1969	2,311	1,884	82%	1,751	76%	36
1970	2,739	2,079	76%	1,946	71%	40
1971	2,904	2,067	71%	1,916	66%	40
1972	3,991	2,908	73%	2,727	68%	56
1973	6,199	4,416	71%	4,153	67%	86
1974	7,951	5,117	64%	4,834	61%	100
1975	8,670	5,057	58%	4,837	56%	100
1976	10,128	6,302	62%	6,079	60%	126
1977	12,120	7,819	65%	7,519	62%	155
1978	12,659	7,030	56%	6,631	52%	137
1979	15,244	7,790	51%	7,053	46%	146
1980	20,132	10,318	51%	9,321	46%	193
1981	23,293	10,722	46%	9,622	41%	199
1982	20,175	8,893	44%	8,036	40%	166
1983	21,899	9,951	45%	8,992	41%	186
1984	27,005	11,641	43%	10,435	39%	216
1985	25,639	10,397	41%	9,422	37%	195
1986	22,349	8,743	39%	7,653	34%	158
1987	26,225	9,836	38%	8,540	33%	177
1988	33,783	11,834	35%	9,886	29%	204
1989	34,383	11,221	33%	9,526	28%	197
1990	31,035	10,363	33%	8,764	28%	181
1991	31,280	9,592	31%	7,962	25%	165
1992	36,207	10,556	29%	8,934	25%	185

Source: FAO

development strategy of the military government was heavily financed by agricultural exports (table 6.1), and supported by cheap food and raw materials (Brandão and Carvalho 1991a). In this sense, the military continued the 1950s approach to export markets and domestic food markets. However, policy moved away from the earlier understanding that agricultural production was unresponsive to price incentives; sectoral policy interventions designed to expand production increased. The shortage of food production in the mid-1960s, for example, was understood as a result of poor incentives to production, an understanding which provoked greater government involvement in agricultural markets rather than removal of price controls.<sup>7</sup> SUNAB (Superintendência Nacional de Abastecimento), the agency controlling agricultural prices, stocks, and profit margins, was created. Subsidized credit for agricultural production and minimum agricultural price policies were expanded in the mid-1960s in order to promote agricultural production. Subsidized credit in particular played a large role in the modernization of the sector. However, price controls were increased from 1973 on in an effort to control inflation (World Bank 1982). These programs remained at the heart of Brazilian agricultural policy into the 1980s.

The relative decline of export crops in the early 1960s reflected the growth of the urban domestic market for food, as the ISI policies of the 1950s and 1960s promoted rapid urbanization. Through the late 1960s the policy focus was on providing domestic market incentives to guarantee cheap food. In the 1960s food crops expanded temporarily to fill the vacuum left by the contraction of coffee in the South and Southeast (Barkin et al. 1991). Wheat absorbed much of this area between 1960 and 1970, but cassava, beans, and corn also expanded. Traditional export products, including coffee and cacao, demonstrated slow growth, but enjoyed favorable international prices which raised export values. Domestic crops in the late 1960s showed slightly stronger growth, reflecting strength of the internal

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<sup>7</sup> Certainly price controls reduced production incentives, at least for large-scale production of staples. How well production would have responded to their removal is an open question, but clearly production decisions would have been influenced by alternative opportunities in export crops.

market and government efforts to increase the food supply. Non-traditional export crops expanded most rapidly (Barkin et al. 1991) (tables 6.2, 6.3).

Beginning with the import crisis of 1973, the government turned to agricultural exports and particularly agricultural import-substitutes as a means to alleviate balance of payments problems. Strong international commodity prices in the 1970s (table 6.4), as well as credit and incentives for export crops and agro-processing, restored the share of export crops in agricultural production to approximately the levels of the 1950s.<sup>8</sup> The crawling peg exchange rate, introduced in 1968, had reduced the bias against agricultural exports but did not change the policy preference for industrialization. Incentives were offered to agro-industries to improve production of processed agricultural goods, including price controls and quotas on exports of raw agricultural products. The disincentive to crop production these measures created was partially offset by credit subsidies. To reduce imports of fuel, the Proalcohol program promoted substitution of domestically produced fuel from sugarcane for petroleum imports. Among domestic food crops, the import-substitute crop wheat merited special production incentives. Through the 1970s government resources for agriculture were largely absorbed by the export sector and import substitution (Baer 1995). Non-traditional exports and import-substitute crops responded with strong growth.

The agricultural sector expanded in both area and productivity through the 1970s with a steady growth in export crops. Agriculture-based exports, including both processed and unprocessed products, rose substantially in the years of the Economic Miracle (World Bank 1982) (tables 6.3, 6.6). Volume growth of raw agriculture product exports was high, averaging over 9% per year 1969-73. Volume growth fell to 2.7% annually between 1973 and 1977 but value continued to rise at about 15% per year with rising commodity prices. Growth in earnings from processed and semi-processed exports reflected

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<sup>8</sup> Calculations of the share of export crops in total production vary greatly with the categorization of export crops chosen. Graham et al. (1987) calculate the share of export crops at about 40% in the 1950s and late 1970s, and about 32% in the late 1960s.



Table 6.2  
Exports of Agricultural Products  
Quantity in 100 MT

Year	Soybeans		Sugar:		Cocoa		Cotton	Cattle		
	Cereals (oil equiv.)	Citrus	total	raw	refined	beans	Coffee	lint	(head)	
1961	1,552	0	1,131	7,833	7,833	0	1,042	10,182	2,057	441
1962	442	0	1,045	4,453	4,453	0	553	9,826	2,159	233
1963	7,090	0	1,442	5,236	5,234	2	687	11,708	2,218	2,254
1964	825	0	970	2,526	2,521	5	747	8,968	2,170	4,152
1965	8,023	0	1,598	7,600	7,600	0	920	8,089	1,957	7,536
1966	9,192	0	793	10,045	10,045	0	1,125	10,099	2,359	3,285
1967	4,663	0	902	10,013	10,013	0	1,144	10,043	1,894	4,665
1968	14,158	0	725	10,262	10,262	0	758	11,075	2,476	2,246
1969	7,382	0	570	10,990	10,990	0	1,196	11,214	4,394	13,386
1970	15,749	27	513	11,262	11,262	0	1,198	9,626	3,428	3,947
1971	14,365	67	644	12,612	12,612	0	1,191	10,343	2,268	2,022
1972	1,813	600	671	25,349	25,349	0	1,023	10,502	2,842	11,914
1973	1,401	909	411	28,219	27,979	220	828	10,714	2,829	15,105
1974	12,387	23	405	23,656	22,545	1,022	1,299	6,838	832	4,272
1975	11,949	2,645	743	17,496	15,146	2,162	1,766	7,820	1,072	2,041
1976	15,210	4,977	382	11,987	8,066	3,607	1,288	8,054	56	4,435
1977	19,006	5,022	359	25,090	18,296	6,250	1,076	5,124	347	4,563
1978	2,415	5,036	480	20,149	13,474	6,141	1,341	6,213	445	2,523
1979	355	5,282	955	18,671	13,937	4,356	1,569	5,622	3	361
1980	287	7,439	940	26,257	19,605	6,119	1,236	7,845	87	1,339
1981	1,017	12,813	653	27,808	17,852	9,159	1,252	8,254	303	781
1982	6,456	8,494	761	28,047	16,198	10,900	1,435	8,880	565	134
1983	8,067	10,709	541	25,716	17,208	7,827	1,528	9,397	1,802	1,287
1984	2,196	9,282	513	31,650	18,477	12,119	1,072	10,319	323	880
1985	182	9,544	790	26,520	13,559	11,923	1,723	10,336	866	301
1986	201	3,967	950	25,346	12,344	11,961	1,352	4,779	366	275
1987	127	9,886	870	22,908	11,006	10,950	1,435	9,876	1,739	990
1988	338	6,800	846	18,335	9,843	7,812	1,345	9,044	348	3,212
1989	139	8,906	981	10,971	5,494	5,039	1,072	9,434	1,748	1,931
1990	57	7,943	818	15,905	9,261	6,112	1,181	8,533	1,087	1,412
1991	36	5,122	1,174	17,144	9,782	6,773	845	10,950	1,219	1,700
1992	76	7,182	886	24,844	13,384	10,542	841	10,216	311	2,500

Source: FAO

Table 6.3  
Exports of Agricultural Products  
Value in \$10,000

Year	Cereals	Soybeans (oil equiv.)	Citrus	Sugar: total	raw	refined	Cocoa beans	Coffee	Cotton lint	Cattle
1961	1,335	0	604	6,561	6,561	0	4,592	71,039	10,968	9
1962	479	0	469	3,950	3,950	0	2,423	64,267	11,217	2
1963	3,024	0	620	7,236	7,232	4	3,503	74,828	11,424	9
1964	424	0	372	3,308	3,295	13	3,482	75,970	10,826	18
1965	5,197	0	746	5,673	5,673	0	2,769	70,569	9,565	105
1966	6,529	0	376	8,054	8,054	0	5,073	76,398	11,100	37
1967	2,729	0	347	8,043	8,043	0	5,916	70,473	9,084	47
1968	7,996	0	311	10,158	10,158	0	4,610	77,447	13,082	40
1969	4,165	0	355	11,505	11,505	0	10,549	81,296	19,601	91
1970	8,802	77	345	12,663	12,663	0	7,768	93,927	15,444	28
1971	8,735	225	411	15,295	15,295	0	6,168	77,248	13,714	40
1972	1,036	1,470	478	40,355	40,355	0	5,916	98,922	18,770	217
1973	1,396	3,256	413	55,868	55,271	598	8,852	124,427	21,807	454
1974	16,951	190	597	132,193	126,163	6,030	21,000	86,431	9,093	149
1975	15,839	15,359	1,197	109,979	97,426	12,553	22,037	85,451	9,779	169
1976	18,566	19,642	565	30,654	20,489	10,165	21,876	217,269	696	325
1977	22,646	28,292	537	46,272	33,247	13,026	43,547	229,894	4,089	345
1978	4,801	29,491	732	35,009	22,871	12,137	45,381	194,651	5,276	263
1979	616	33,001	1,883	36,381	26,998	9,383	48,687	191,762	50	55
1980	667	42,125	1,842	128,835	94,194	34,641	29,169	248,606	1,123	169
1981	3,301	65,100	1,638	106,218	66,581	39,637	24,162	151,665	4,150	86
1982	7,108	37,902	1,895	58,027	33,635	24,392	21,598	185,754	6,177	5
1983	7,839	46,096	1,158	52,692	35,896	16,796	28,377	209,580	18,851	118
1984	2,998	65,135	1,187	58,679	37,375	21,304	24,904	256,434	4,156	80
1985	493	60,252	1,979	36,856	19,971	16,886	36,080	236,921	7,675	16
1986	417	14,207	1,848	38,203	19,137	19,066	27,425	200,594	1,685	15
1987	277	30,429	1,868	32,511	16,499	16,013	26,559	195,920	16,018	75
1988	852	29,423	1,816	34,586	18,278	16,308	21,550	200,895	3,130	301
1989	410	35,735	1,928	30,620	14,715	15,905	13,432	161,031	15,774	197
1990	151	33,353	1,968	52,455	32,568	19,887	12,779	110,649	12,799	184
1991	167	21,311	2,393	44,161	25,613	18,548	8,854	138,319	14,772	211
1992	208	29,122	1,957	59,944	33,026	26,918	8,351	97,434	2,898	200

Source: FAO

Table 6.4  
Commodity Price Index  
1990=100

Year	Soybeans (US)	Soybean Oil	Sugar (Brazil)	Wheat (Argentina)	Coffee (Brazil/New York)	Cotton (US)
1964	44.6	52.1	37.2	45.3	55.7	
1965	47.4	60.3	21.2	38.8	52.2	42.3
1966	51.2	58.4	22.8	38.7	48.4	36.8
1967	45.6	48.5	22.9	43.2	45	32
1968	42.9	39.8	28.2	39.6	44.6	37.9
1969	41.7	44.1	29.8	40.6	48.8	35.4
1970	47.4	64	32	37.7	66.6	34.9
1971	50.9	67.9	34.5	41.2	53.4	38.5
1972	56.7	53.8	45.3	46.1	62.7	47.7
1973	117.7	97.4	56.2	67.4	82.6	78.1
1974	112.2	186	159.2	134	87.5	80.6
1975	89.8	125.9	183	119.1	98.5	62.8
1976	93.7	98	72.3	92.8	178.4	94.6
1977	113.5	129.7	51.7	67	318.8	85.7
1978	108.7	135.6	48.3	81.5	197	80.2
1979	120.7	148	55.1	101.3	213	86.5
1980	120.1	133.7	136.7	127.6	249.1	113.2
1981	116.9	113.3	106.1	134.2	222.4	100.3
1982	99.1	100	59.1	115.6	171.5	83.6
1983	114.2	117.7	59.4	99.4	170.3	95.3
1984	114.3	162	57.6	91.6	178.6	94.9
1985	90.9	128.7	41.8	79.8	177.7	81.7
1986	84.5	76.5	44.1	67.8	275.9	73.4
1987	87.4	74.7	42.7	62.2	126.9	88.4
1988	123	103.6	52.8	81	145.4	79.9
1989	111.4	96.4	76.2	103.1	117.8	89.4
1990	100	100	100	100	100	100
1991	97.1	101.4	74.4	62.2	87	98.4
1992	95.4	95.8	69.8	83.4	67.1	76.2
1993	103.4	107.3	73.4	—	79.4	77.8

Source: IMF (1994)

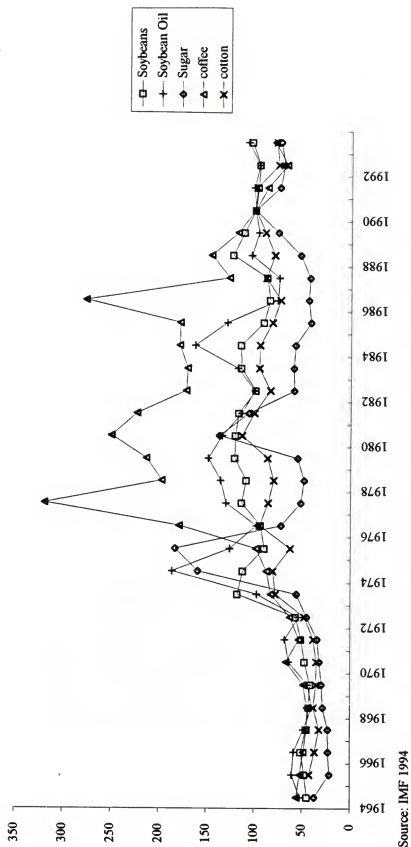


Figure 6.1  
Commodity Price Index  
1990=100

rising quantities in both periods. Exports were led by soybeans whose output expanded by over 37% annually, so that by the mid-1970s Brazil had become the world's third largest producer.<sup>9</sup> Oranges, primarily for use in concentrate, also saw a dramatic expansion, increasing at 12% annually between 1966 and 1977 (Baer 1995). The shocks of the 1970s and the increasing import bill also brought a large increase in agricultural exports, especially processed and semi-processed products (Graham et al. 1987)<sup>10</sup>, responding to foreign exchange demand.

Domestic food crops on the whole performed poorly in the 1970s; wheat and corn--both tradeables--were the exceptions.<sup>11</sup> Those policies that favored exports--strong international prices, policy support, modernization incentives--pulled resources away from domestic production. Domestic production was left mainly to small and medium farmers with traditional techniques, who faced discriminatory policies, price ceilings, and high sales taxes (Baer 1995). While in the 1950s and 1960s domestic food crops had been largely produced by squatters, tenant-farmers, and share-croppers in the export-oriented Center-South<sup>12</sup>, especially in coffee lands, these producers were pushed out by changes in the structure of production in the late 1960s and 1970s, and food production in the region fell. At the end of the 1970s, however, the combination of poor harvests, rising interest rates, and rising fuel prices lowered output seriously, leading to renewed government attention to domestic agricultural production.

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<sup>9</sup> Brandão and Carvalho (1991b), among others, argue that if soybeans are not considered, agricultural export expansion over this period is not remarkable.

<sup>10</sup> Exports by volume of processed and semi-processed products rose at 22% and 52% per year respectively between 1969 and 1973; and 17% and 26% per year between 1973 and 1977 (table 6.6). In the latter period, expansion of agriculture-based products was considerably faster than non-agricultural manufactures (World Bank 1982).

<sup>11</sup> Wheat enjoyed government support at all levels from grower to processor to consumer (Graham et al. 1987). Wheat differs from most of the domestic food crops in that it is often imported. Therefore domestic production serves as an import substitute. For a summary of wheat policies, see Calegar and Schuh (1988).

<sup>12</sup> The term Center-South is used to refer to the South, Southeast, and Center-West regions together, that is those regions that are now largely oriented to export agriculture.

### Export Diversification and Incentives to Processors

Export diversification policies in place from the late 1960s through the 1980s played a key role in shaping agricultural production, both in increasing the number of important export crops and increasing the share of processed agricultural products (table 6.6). Policy measures included those designed to raise manufactured exports, namely the *crédito prêmio*, tax breaks, duty drawbacks, and credit subsidies, which supported the processing industries. Specific to the agricultural sector, export controls and quotas on unprocessed agricultural exports forced an increase in sales to domestic processors<sup>13</sup> to ensure their successful establishment. Support for agro-industries, in addition to improving domestic supply of processed products, created industries that contributed substantially to export earnings. Export incentives did not remove protectionist incentives to produce for the domestic market but rather attempted to offset or counteract them through equally powerful incentives to produce for export. So another layer of incentives was added, rather than removing the disincentives to export.<sup>14</sup> Remaining import restrictions and exchange-rate policy continued to cause overvaluation of the cruzeiro, maintaining the overall anti-export bias of the economy.

Policies to encourage domestic processing of agricultural products tended to turn the domestic terms of trade against agriculture. Promotion of domestic processing required restriction of export markets and controlled prices for raw products, amounting to taxation of raw products, while processed products were subsidized. Crops affected by support for processing industries included soybeans, cotton, cacao and, from the import-substitution side, sugar and wheat (table 6.5) (Graham et al. 1987).

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<sup>13</sup> The rationale for support for agro-industries included claims that these industries "have stronger linkages to the rest of the economy, are less capital intensive, conform more closely to domestic comparative advantage, produce goods of benefit to the lower-income groups and lead to a more balanced regional pattern of industrial activity." (World Bank 1982, p.78)

<sup>14</sup> Graham et al. (1987) suggest that this may be a reasonable policy approach in a large economy such as Brazil where the trade/GDP ratio is relatively small.

Table 6.5  
Agricultural Exports

Year	US\$					Total				
	Soy Meal	Bulk Soy	Soy Oil	Purified Soy Oil	Cotton Fiber	Orange Juice	Woven Cotton	Soy Meal	Bulk Soy	Soy Oil
1961	6872				343		1296	73267		
1962	6376				86	64	945	96771		
1963	4136	3107			31	2167	945	62014		
1964	3024	7343			379	1437	2912	43821		
1965	7676				3316	1884	4939	105058		
1966	14591	13028			8199	4737	2176	164949		
1967	10219	29243			2619	5693	1906	123359		
1968	16981	6291			1886	11631	1831	234530		
1969	23415	29064			3055	10910	4136	295365		
1970	43637	27084			767	14736	9037	525365		
1971	81532	24309			2245	6813	11049	91407		
1972	152348	127927			14536	27782	41499	1403329		
1973	426235	494153	23806		8753	43028	52621	1581493		
1974	303044	566271	1890		9	66404	59170	2030942		
1975	465774	684901	152442		1047	67836	62203	3133581		
1976	795004	788538	174642		21782	81249	100900	4373867		
1977	1150152	709606	274216		2699	120263	177040	5353663		
1978	1049908	169896	283156		11755	117093	332636	5416696		
1979	1136933	179505	326798		7111	155249	281452	5170606		
1980	1449013	393930	411111		10139	181155	110252	6581925		
1981	2136176	403672	503316		147679	183675	114758	894373		
1982	1680322	123457	222359		150822	150142	552264	7641005		
1983	1793219	308571	155057		303899	194774	607951	8492849		
1984	1460179	454116	557170		941717	234327	1414500	7587025		
1985	1174657	762683	331393		271124	156295	748925	8388020		
1986	1180579	243218	71371		66743	14681	636987	6542234		
1987	1449966	570277	172341		131951	213258	830302	7802299		
1988	2022917	728356	45149		249085	188989	1144332	8127319		
1989	2136528	1153709	302206		55148	137876	1018954	9870845		
1990	1610492	909753	321368		22758	137876	143326	8744463		
1991	1369362	443278	208143		7537	112876	898249	7487154		
1992	1935940	808566	264871		4341	104352	1214815	8544890		
1993	1813015	946466	306322		26349	43261	826739	9397882		

Source: CACEX, World Bank 1990

Table 6.6  
Processed and Semi-Processed Agricultural Exports

Year	<u>US \$ Millions</u>				<u>Percent of Agricultural Exports</u>		
	Raw Materials	Semi- Processed	Processed	Total	Raw Materials	Semi- Processed	Processed
1961	1,072	109	24	1,205	89	9	2
1962	936	91	21	1,048	89	9	2
1963	1,117	101	21	1,239	90	8	2
1964	1,097	106	22	1,225	90	9	2
1965	1,125	136	37	1,298	87	10	3
1966	1,270	139	51	1,460	87	10	3
1967	1,145	132	65	1,342	85	10	5
1968	1,319	166	76	1,561	84	11	5
1969	1,567	193	90	1,850	85	10	5
1970	1,737	196	119	2,052	85	10	6
1971	1,639	207	221	2,067	79	10	11
1972	2,297	344	316	2,957	78	12	11
1973	3,489	484	414	4,387	80	11	9
1974	3,764	739	570	5,073	74	15	11
1975	3,756	679	558	4,993	75	14	11
1976	4,829	325	772	5,926	81	5	13
1977	5,757	750	1,042	7,549	76	10	14
1978	4,696	1,075	1,191	6,962	67	15	17
1979	4,944	1,425	1,303	7,672	64	19	17
1980	6,456	1,535	1,818	9,809	66	16	19
1981	6,447	1,258	2,304	10,009	64	13	23
1982	5,564	735	1,958	8,257	67	9	24
1983	6,549	685	2,217	9,451	69	7	23
1984	6,584	1,209	3,064	10,857	61	11	28
1985	6,404	1,012	2,230	9,646	66	10	23
1986	4,832	653	1,651	7,136	68	9	23

Source: World Bank 1990



Non-quantifiable taxation of exports included requirements for export authorization; specific quota restrictions on commodities including beef, soybeans, sugar, cacao, cattle products, coffee, sisal, and cotton yarn; export prohibitions on some products including sugarcane and rice; and quality controls, all intended to ensure domestic supply and promote processing (World Bank 1982). Through this period, in general, the higher the level of processing, the higher the subsidy level provided in agricultural production. As of 1975, the implicit tax on unprocessed agricultural products was about 13%, while subsidies increased with value-added, especially for processed soybeans, cotton, and cacao, reaching 50% for textiles (Pastore et al. 1978).<sup>15</sup> A study by Brandão and Carvalho (1991b) found that, between 1966 and 1983, while direct agricultural price interventions taxed raw export crops and subsidized import-substitute crops, the combined effect of direct and indirect interventions was taxation of all crops.<sup>16</sup> Agricultural producers were penalized in favor of agricultural processors by the incentive policies. The political solution to this imbalance was found in subsidized rural credit, which promoted production of industrial input crops.

Export promotion was successful in increasing and diversifying exports. Agriculture-based exports, both processed and unprocessed, expanded at 17% per year between 1965 and 1977 (World Bank 1982). Their share in all merchandise exports declined but did not fall below two-thirds until 1978 (figure 5.2). Excluding coffee, which grew at only 8% per year, sectoral exports grew at 22% per year, and soy-products at 41% (World Bank 1982). The number of agricultural products earning over US \$100 million rose from two in the mid-1960s to nineteen in 1981 (Graham et al. 1987). While in the

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<sup>15</sup> Other studies (e.g., Tyler 1985, Brandão and Carvalho 1991b) have estimated different levels of taxation and subsidization. However, it is clear that unprocessed products were taxed while processed products were subsidized.

<sup>16</sup> Indirect interventions include tariffs and subsidies on imports and exports of non-agricultural goods. Brandão and Carvalho (1991b) found that cotton suffered negative protection for the whole period (1966-1983); soybeans saw increasing taxation; rice was protected in the earlier years but later taxed; wheat was negatively protected in some years despite large direct subsidies; and corn was protected, but decreasingly so over the period.

mid-1960s raw and unprocessed agricultural products accounted for 84% of agricultural exports, by 1978 unprocessed agricultural products accounted for only 67% of agricultural exports, despite expansion in absolute terms (Graham et al. 1987). Much of the shift occurred during the Economic Miracle, when processed and semi-processed agricultural exports (table 6.6) grew at 47% annually (World Bank 1982). Brazil captured half of the world's soymeal trade and one-third of the soy-oil market by the late 1970s. Raw cotton exports were replaced almost entirely by yarn and cloth exports. Processed coffee, cacao, and sugar exports also rose (World Bank 1982, 1990). The new non-traditional export crops that emerged in this period included soy and oranges, the most rapidly expanding crops beginning in the early 1970s. Sugar and wheat expansion began after the oil crisis, reflecting the Proalcohol program and import-substitution efforts. The cost of opening to international markets and export promotion has generally been displacement of food crop production and inflation (Goodman 1989).

### Subsidized Credit

Subsidized credit was the main policy tool used in the 1960s and 1970s to support basic agricultural production. Subsidized credit expanded through the period not only beyond the point where it provided a positive incentive to agricultural production but to the point where it had a very detrimental effect on the government's fiscal position and on inflation. This remarkable expansion of subsidized credit<sup>17</sup> was largely created by charging interest rates below the rate of inflation. It is interesting here not primarily because of its detrimental effects on fiscal and monetary management but

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<sup>17</sup> The credit subsidy reached 20% of agricultural GDP in 1980 (Baer 1995). Credit levels varied but were always high in the 1970s. Credit fell by 11%, for example, in 1977 because of high inflation and tight monetary policies, but rose again in 1978. In 1979 credit was made a function of production costs, which served to further increase credit levels (World Bank 1982).

as a reflection of government efforts to promote production--to extract resources--from the agricultural sector.

All agricultural credit expanded threefold in the early 1970s and held constant at high levels in the late 1970s. Subsidized credit expanded even more rapidly. New loans reached over 70% of agricultural GDP (Graham et al. 1987).<sup>18</sup> The special role of agriculture was acknowledged when economic policies to restrict credit and monetary expansion in the late 1970s exempted agricultural credit. These transfers to the agricultural sector were extracted from the rest of the economy through a reduction in fiscal resources, increasing inflation, and high interest rates (World Bank 1982). This heavy investment in part reflected rising real food prices and evidence that the extensive model of agricultural growth was reaching its limits (Goodman 1989).

Subsidized credit provided the financial support for important transformations in the agricultural sector, particularly the expansion of large-scale, modern export operations. Credit availability was biased toward the Center-South<sup>19</sup> and export crops, as well as toward large farmers. In the late 1970s, five crops were receiving 60% of credit: soybeans, coffee, sugarcane, cotton and wheat (Grindle 1986, see also Goodman 1989). Black beans and cassava, however, received only 4% of credit (World Bank 1982).<sup>20</sup> The concentration of subsidized credit in the hands of larger farmers<sup>21</sup>, and the increase in land values associated with credit availability, had important effects on the distribution of rural income and

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<sup>18</sup> One study (da Mata 1982) found that agricultural credit subsidies increased from less than 1% of both the federal government tax base and the monetary base in the early 1970s, to 12% and 21% respectively by 1980.

<sup>19</sup> In 1970, the South received 65% of government loans supporting agricultural exports (Grindle 1986). Yet, even in São Paulo, fewer than one-third of farmers received credit (World Bank 1982).

<sup>20</sup> Black beans and cassava accounted for 17% of production (World Bank 1982).

<sup>21</sup> The share of small loans in total credit fell from 34% to 11% for crops, and from 33% to 12% for livestock, between the mid-1960s and mid-1970s for (Graham et al. 1987, Baer 1995). By the late 1970s, 60% of credit was going to the 10% in the highest loan strata and 45% to the highest 5% (Graham et al. 1987).

agricultural production patterns, both in terms of intensification of production and expansion of the frontier. Credit was used for large capital investments.<sup>22</sup> Most small farmers felt the impact of the large expansion in subsidized credit only through increasing land prices and increased competition from their larger neighbors.

#### Debt Crisis, Economic Instability, and Reversal of the Trade Balance: The 1980s

While the balance of trade in agriculture was always strong, the agricultural trade surplus covered a shrinking share of imports with the shocks of the 1970s (figures 5.1, 5.2). The poor harvests of 1978 and 1979, along with worsening inflation and external accounts contributed to policy concern with increasing incentives for production in the domestic and export sectors. Foreign capital inflows and strong commodity prices in the 1970s allowed considerable government investment in agriculture through subsidized credit and incentives to agro-processing. The shocks of the 1980s made agricultural growth essential to meeting both external and internal demands on the economy, but limited the role of government investment.

The growth of the agricultural sector became particularly critical as the recession of the 1980s hit the industrial sector. The government returned to promotion of agricultural growth as a source of financing for non-agricultural imports and for increased import substitution in petroleum, under the auspices of the Agricultural Priority Program, which provided the primary means of promoting production of agricultural tradables in the 1970s. Poor commodity prices in the early 1980s, particularly for traditional commodities, reduced the value of agricultural resources in earning foreign exchange. Rising fuel and wheat prices, however, increased their value as import-substitutes. Agriculture also bore some of the reduction in imports through a decrease in imported inputs. Following

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<sup>22</sup> Because large farmers had access to credit beyond what they could reasonably use, credit was often diverted to other purposes, but investments in agriculture were still substantial.

on the oil crisis and the debt crisis, the government could no longer afford the inflationary impact of heavily subsidized credit. The less costly minimum price program became the primary policy tool for promoting production.

Agricultural growth was relatively steady despite, or perhaps because of, the second oil shock, the debt crisis, and the reform of government rural credit. Despite the economic stagnation and the series of shocks, agricultural sector growth continued at 3.1% from 1980 to 1988 while the industrial sector slowed to 1.2% (Rezende 1991). The pressure for foreign exchange earnings drove up export production, despite poor commodity prices which countered export incentives (Rezende 1991). Most export crops reflected the world recession of the early 1980s, and then expanded through the rest of the decade as world markets recovered and Brazil struggled to meet its foreign exchange obligations. The devaluations of the 1980s provided a stimulus to both agricultural exports and import-substitutes. Agricultural products provided some compensation for falling imports. As manufactured exports contributed more substantially to foreign exchange earnings through the 1980s, agriculture played an increasing role in import-substitution.

Agricultural growth was thought to be facing new constraints at the beginning of the 1980s (World Bank 1982, Brandão 1988), since the easily exploited frontier was nearly gone, and the incorporation of new lands would require larger investments in infrastructure and research. The Amazon, the only large area of unexploited land, would itself require large investments in research and infrastructure to make surplus production feasible (Alves and Contini 1988). After years of increase through expansion, the need to improve the productivity of land was clear. Agricultural policy sought to improve production of both exports and import-substitutes. In the 1980s improved yields were achieved for a number of tradeable crops.

### Agricultural Priority Program and Investment

The Agricultural Priority Program of 1979 brought together the two otherwise conflicting objectives of improving the trade balance and improving domestic food supply.<sup>23</sup> In 1979 most price controls on agricultural products were removed, credit increased, and the minimum price program revamped to improve production incentives.<sup>24</sup> The Proalcool program was expanded in 1979 when oil prices rose again. Policies favoring domestic crops were facilitated by the fluctuation and downward trend of many international commodity prices (table 6.4); by technological innovations that allowed for productive agricultural expansion into the *cerrado* and increasing yields<sup>25</sup>; and by the slow growth of the economy which released labor and capital to the domestic agricultural sector.<sup>26</sup> When subsidized credit was abandoned in 1983, the Agricultural Priority Program was largely limited to the minimum price program. Strengthening of the minimum price program was seen at the time as compensation for the credit reform. It can also be seen as compensation to the domestic market for stimulus given to export agriculture by devaluations.

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<sup>23</sup> A number of problems were anticipated in the agricultural sector in the late 1970s which the Agricultural Priority Program sought to address. Rezende (1991) summarizes these as 1) poor growth in domestic products, with consequences for urban consumption and inflation; 2) weak effects of growth for rural labor; 3) uncertainty of agricultural growth as the oil shocks raised production and transport costs; 4) the elimination of the agricultural credit subsidy (by 1983) and the introduction of indexation, which could limit agricultural investment and production; 5) worsening food problems because of government export promotion and import-substitution in energy efforts.

<sup>24</sup> In addition, a new system of crop insurance and reform of the land tax provided increased production incentives (World Bank 1982).

<sup>25</sup> The agricultural research agency, EMBRAPA, was established in 1973. EMBRAPA's research efforts were probably most important in developing ways to increase the productivity of the acidic soils of the *cerrado* region, which allowed for expansion of the modern agricultural frontier into the Center-West.

<sup>26</sup> Rezende (1991) argues that the recession of the early 1980s favored small family farm production as wage rates fell, reducing the attraction of mechanization, and as the opportunity cost of working small farms fell.

Domestic-oriented agriculture performed strongly in the late 1980s. Import-substitution in energy along with export incentives to relieve balance of payments constraints had turned internal terms of trade against domestic food crops in the early 1980s. A fall in output in 1983 and rising agricultural prices highlighted the domestic food production problem. By the late 1980s and early 1990s, food production had been increased considerably by removal of discriminatory policies, especially for rice and corn (Baer 1995). Rice, corn, and wheat all showed growth in the 1980s, mostly because of increases in yields. Even beans and cassava showed increased yields, though area in production showed little or no growth. A modern irrigated rice sector developed in Rio Grande do Sul<sup>27</sup> and the "modern" corn sector expanded in the South and Southeast (Baer 1995). Both the new rice and corn sectors have strong ties to agro-industries<sup>28</sup>, which have served domestic needs.

The subsidized credit program had contributed primarily to capital investments and inputs for large-scale operations. However, drastic cut-backs in subsidized credit in 1983 and 1984 did not substantially affect sectoral investments.<sup>29</sup> Agricultural investment increased in 1984 along with rising product prices. Sectoral investment, primarily for processing industries, remained high for most of the

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<sup>27</sup> This sector was providing 40% of Brazilian rice output by 1991 (Baer 1995).

<sup>28</sup> Corn is now in some areas produced as feed for the growing meat production industries, rather than as a food crop.

<sup>29</sup> Rezende (1991, also Goldin and Rezende 1990) attributes the resilience of the agricultural sector to several factors. First, subsidized rural credit had reached record levels in the preceding years so that farmers were already highly capitalized; second, 1980-82 had seen good harvests; and third, agriculture received considerable support from the minimum price program. So despite the fall in 1984 of operational credit by 50% and investment credit by 75%, and despite the macroeconomic recession and poor harvests, agricultural output in 1984-85 was strong. Moreover, given that many farmers never had access to this credit, the effect of the interest rate subsidy reduction on most producers was not great (Brandão and Carvalho 1991a).

Rezende points to five phases in input use in the 1980s. During the recession of 1981-1983 input use fell. 1984 saw a spectacular recovery that was maintained through 1985. 1986 saw a further increase, which leveled off in 1987-88. The increase in input prices relative to product prices, because of the oil price hike, was the main reason for the decline at the beginning of the decade. The boom in agricultural investment occurred just when rural credit policies were at their strictest; in contrast, 1981-83 had seen a decline in investment when credit levels were at their highest. The consumption of inputs was clearly independent of rural credit, and responded more to exogenous price shocks than to this domestic policy tool (Rezende 1991).

decade<sup>30</sup>, thanks to demand for foreign exchange, declining input and transport prices following the fall in petroleum prices, and the expansionary macroeconomic effects of the Cruzado Plan (Rezende 1991).<sup>31</sup>

### Minimum Price Program

The minimum price program<sup>32</sup> became the main agricultural sector policy tool in the 1980s as the battle against inflation and fiscal deficits constrained the use of subsidized credit and the government strove to increase agricultural exports and domestic food production. The long-standing minimum price program was intended to reduce farmer uncertainty and risk by ensuring minimum prices at the time of planting and, together with the crop storage program, to reduce seasonal price variations. The reduction in uncertainty was expected to increase production and investment. Until the 1980s, however, the program had little effect since minimum prices were generally set far below market prices.<sup>33</sup> Use of the minimum price program has been credited with keeping the agricultural sector afloat, and by extension the whole Brazilian economy, in the recession of the 1980s (Goldin and Rezende 1990).

The objectives of the minimum price program included, *inter alia*, prevention of food supply shortages and compensation for trade liberalization to ensure continued export production. Although

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<sup>30</sup> The current account deficit reached its worst point in 1982.

<sup>31</sup> Several elements of the Cruzado Plan had a positive impact on agricultural investment. The deindexing of the financial system, including deindexation of rural credit (indexation of credit had served to reduce subsidy levels), reduced financial pressure on farmers. Deindexation, combined with the inflationary effects of expansive monetary policy, led to capital flight toward real assets, including land and livestock. The explosion of land prices automatically made landowners wealthier, and probably increased their willingness to make investments. With the failure of the Cruzado Plan, rising interest rates and falling land and agricultural prices, investment leveled off (Rezende 1991).

<sup>32</sup> Minimum prices were established under the program for over forty commodities; sugar, coffee, wheat, and cacao prices were administered separately (World Bank 1982).

<sup>33</sup> Most government minimum price purchases before the 1980s were concentrated in the North, where transport and commercialization were difficult, and in the Northeast for some traditional crops that had lost markets. In 1979 a special purchase program was introduced for the frontier, benefiting Mato Grosso, Goiás, Pará, and Rondônia (World Bank 1982).



the program was intended to cover a wide range of crops, it concentrated on soybeans, rice, cotton, and maize. The government accumulated large stocks under the program between 1986 and 1988 and, as funding fell short in the late 1980s, the credibility of the price scheme foundered (World Bank 1994). Fiscal cuts in 1988 forced substantial cutbacks in the program and, until 1991, market prices often fell below the minimum price, as the government failed to meet its commitments.<sup>34</sup> The program was reactivated in 1991-92 in the face of falling domestic and tradeable output in the late 1980s. Output of some tradeables, rice and corn, responded in the early 1990s, but increased production only served to lower domestic prices which reinforced the need for price supports (World Bank 1994).

#### Agriculture and the Economic Crises of the 1980s

In the 1980s, agricultural performance was not closely tied to national economic cycles, which allowed it to provide some countercyclical benefits. While the agricultural growth rate fell in the 1980s, it did not fall as far as the industrial growth rate. The pivotal place of agriculture in supplying cheap resources to the international and domestic sector underlies this continued growth. Through the recession and foreign exchange problems of the 1980s, agriculture has continued to provide these resources.

Traditional theory<sup>35</sup> does not explain the countercyclical behavior of Brazilian agriculture in the 1980s. Rezende partially explains the lack of correlation between agricultural growth<sup>36</sup> and industrial

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<sup>34</sup> Government expenditures for the two components of the minimum price program, purchases and credit based on storage, fell from US\$ 1 billion in the mid-1980s to US\$ 13 million in 1992 (World Bank 1994).

<sup>35</sup> Traditional theory states that agricultural output can be expected to be less variable than industrial output, at least in the short run, because of low elasticity of supply and the downward flexibility of land and agricultural labor prices (Paarlberg and Chambers 1988). This explains the relative stability of agricultural production, but not the countercyclical behavior.

Agricultural goods were priced low through most of the 1980s, which suggests that other factors were compensating producers for low prices (Rezende 1991). Wages for agricultural labor showed a long-term downward tendency through the decade reflecting domestic economic recession. Land purchase prices, however, were driven up by inflation and instability. Rental prices, which reflect the productive value more closely did not rise as rapidly (Schneider 1992).

<sup>36</sup> Crops and livestock production had different cyclical behavior over the decade. Rezende asserts that crop production was effectively independent of the rest of the economy, more affected by climate than economic factors. Livestock production tends to be counter-cyclical since slaughter rates, i.e. production, increases in times of

growth in terms of the international character of the Brazilian agricultural sector.<sup>37</sup> The domestic prices of exportable goods are less affected by domestic economic fluctuations than non-tradeables. In fact, these prices may behave countercyclically depending on the exchange rate and international commodity prices. Although commodity prices were low and terms of trade deteriorated (tables 5.7, 6.4), the demand for foreign exchange created by the debt clearly raised the value of products that could earn foreign exchange or reduce foreign exchange requirements through import substitution. While imports dropped sharply in the early 1980s, following devaluation of the currency, exports rose as a share of GDP and unevenly in dollar value (table 5.7).

This international character, however, does not explain the relatively strong growth of both domestic and export agriculture. Empirical evidence seems to challenge the theory that external adjustment will hurt domestic agricultural production (Rezende 1991). Devaluation should lower the relative price of domestic goods and raise the relative price of exports. However, devaluation may raise domestic prices in terms of non-traded goods in other sectors because of the substitution effect. The price rise in tradeables increased the price of substitutes—rice, beans, cassava, corn, and animal products—thus providing an overall stimulus to domestic agriculture. Nevertheless, this does not explain why rising prices for exports did not substantially increase production for export relative to domestic production, since the domestic price increase would presumably be less than export price increases. The minimum price policy may have provided sufficient compensation to the domestic agricultural sector to ensure its expansion (Rezende 1991, Goldin and Rezende 1990).

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economic downturn. If we look at this the other way around, with production defined as raising livestock rather than slaughter rates, it follows the economic cycle. Agriculture apart from livestock probably maintained the growth rates of the late 1970s (Rezende 1991).

<sup>37</sup> Rezende (1991) does not consider the expanding export of manufactures, which presumably were also affected by international markets.

Rezende suggests that, given weak international prices, Brazil's only option for growth was through the domestic market. The minimum price program was thus used to promote domestic growth in the face of restrictive external factors. However, two other factors must be considered in explaining agricultural expansion in the 1980s. First, the weakness of international markets for commodities in the early 1980s (table 6.4) strictly limited the opportunities for increasing exports to meet pressing foreign exchange needs.<sup>38</sup> Cuts in imports, including manufactured and agricultural imports, through import substitution and reductions in consumption, were more feasible than export expansion. Much of the external adjustment in the 1980s was accomplished through repression of demand and reduction of imports.

Second, agriculture allows for extraction of cheap resources to close the foreign exchange gap. Devaluations served to facilitate exports but also lowered their value (by volume) considerably in terms of foreign exchange earnings. The concomitant increase in import prices encouraged import substitution in agriculture. The pressure of the foreign exchange gap, together with the focus of the minimum price program on domestic tradeables (soy, rice, corn), forced further import substitution (see Chapter 7). Brazilian wheat, which was largely imported in the early 1980s, was substantially replaced with domestic production. Sugar expanded rapidly in the 1980s, as it increasingly replaced fuel imports.

Looking at this phenomenon in broader terms, it appears that, in the face of poor international markets, the country opted to reduce imports. A form of import substitution in resources, rather than expanded exports, was promoted for balance of payments reasons.<sup>39</sup> Agriculture's contribution was made in the domestic market, rather than in improving the trade balance directly through raising exports. Agricultural exports accounted for only about 15% of the improvement in the trade balance (Rezende

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<sup>38</sup> Markets for manufactures were also weak in the early 1980s.

<sup>39</sup> A similar pattern of import reductions occurred in South America as a whole. However, smaller countries relied on expanded agricultural exports without the possibility of substantial industrial exports (see Chapter 4).

1991) from the early 1980s through 1985.<sup>40</sup> In other words, agricultural growth was inward-looking, just when the external crisis suggested that it would be outward-oriented.<sup>41</sup> The direction of growth owes much to the government's choice of policies and the limits imposed on export growth by low international prices (Rezende 1991). The collapse of the minimum price program in the late 1980s under fiscal pressures, and the turn to trade liberalization, can be expected to force a reorientation of the use of agricultural resources more directly toward exports.

### Liberalization in the 1990s

Substantial trade and sectoral reforms were initiated in 1990. Reductions in government intervention in the agricultural sector included the elimination of state trade monopolies and the end of price controls for many agricultural products. The volume of agricultural credit was reduced and monetary corrections and interest rates moved closer to those of other sectors.<sup>42</sup> Government investment in research has also fallen. On the export side, trade liberalization has included elimination of export taxes, quotas, and licenses for most agricultural products; the end of export subsidies for agricultural products, except indirectly through drawbacks and free trade zones; and the phasing out of export

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<sup>40</sup> Some of the arguments Rezende raises clearly parallel the ideas of import-substitution of the 1950s. He states, "The principal contribution of agriculture in an economy with the size and industrial base of Brazil resides in its ability to continually improve domestic food supply." (1991, p.210) He suggests that increased domestic production in agriculture lowered food costs, thus lowering the cost of labor and increasing the competitiveness of manufactures, allowing manufactures to solve the balance of payments problem. This perspective, however, ignores the substantial contribution that Brazilian agriculture makes as an industrial supplier, as a market for industrial products, and, in the energy sector, as an import-substitute. The government used agricultural resource exploitation to support both export and import-substitution industries.

<sup>41</sup> This is essentially the proposition that resources will be exported to meet debt obligations.

<sup>42</sup> From 1985 to 1988 public expenditure on agriculture was divided between credit, pricing and marketing, and marketing boards at a ratio of about 40%, 30%, and 30% (World Bank 1994). From 1988 to 1991 there was an overall fall in public expenditure in these areas of 60%, but only of 10% in the credit component, so that credit comprised 80% of expenditure in the early 1990s (about US\$ 3.4 billion) (World Bank 1994).

financing programs.<sup>43</sup> On the import side, a number of controls remained, however, including tariffs on imports of chemical inputs, protection of agricultural machinery, and a large government role in importing and storing agricultural stocks.

Between 1987 and 1991 agricultural output fell because of poor prices, poor harvests, falling credit, and rising interest rates (World Bank 1994). Per capita food production fell as imports rose sharply. The 1991-92 season produced a good harvest and prices rose in relation to inputs. However, with liberalization, agricultural imports continued to rise. Wheat production has fallen since the beginning of the liberalization program and imports ballooned in the 1990s (see Chapter 7). In 1992, as a result of falling agricultural investment, Collor pushed the banking sector to increase agricultural loans, lowered taxes on marketing, moved minimum prices closer to market prices, and removed trade restrictions on inputs (World Bank 1994). Planted area has fallen or levelled off for most crops in the 1990s, with the notable exception of the non-traditional exports, oranges, soybeans, and corn (as an industrial input), suggesting that these are the crops which will fare best under the more liberal regime.

The effects of Brazilian agricultural liberalization on exports are limited as long as international agricultural markets remain highly protected. The implications of the liberalization of agricultural trade initiated in the Uruguay Round of GATT for Brazilian crops are unclear.<sup>44</sup> Rising prices for developing country exports (Young 1990, Goldin and Knudsen 1990) may increase the importance of agriculture in meeting the foreign exchange gap. In particular, temperate crops which compete directly with developed country production, including soybeans, can be expected to expand. It seems likely that rising returns to agriculture will increase modernization and labor displacement given the structure of

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<sup>43</sup> Some tax incentives for capitalization and vertical integration remain (World Bank 1994, Lopes 1994). Discriminatory treatment of raw agricultural exports remains in the form of the drawback system for the value-added tax (the ICMS) which favors processed products. An unsuccessful effort was made to reduce income tax preferences and to tighten the administration of the land tax (World Bank 1994).

<sup>44</sup> See Hoekman (1995) for a summary of agricultural policies under the Uruguay Round.

international markets. The case of Chile, which has experienced deindustrialization and a very strong expansion of export agriculture since liberalization bears noting here.<sup>45</sup> Despite Brazil's relative success in restructuring its comparative advantage toward industry, the facility with which cheap resources can be extracted from the land and labor displacement problems remain. With liberalization of international markets, increased dependence on agricultural exports is likely.

### Modernization, Mechanization and Labor Displacement

These international pressures and policy responses had wide-reaching implications for the structure of the agricultural sector and land-use patterns. The modernization of Brazilian agriculture, assisted by government policy, has been referred to as "conservative modernization" in that the traditional *latifundio/minifundio* system has given way to modern agro-industrial complexes in the most productive regions<sup>46</sup>, without improving land distribution patterns (Goodman 1989, Grindle 1986).<sup>47</sup> Modernization has emphasized intensification and capital investments to raise productivity, including tractors, fertilizers, and other green revolution technology. Most modernization occurred, and continues to occur, in the agricultural export sector, especially in the Southeast, and has been limited to a fairly small group of farmers. The internal frontier, that is unexploited lands within developed areas, and much of agricultural land of the Center-West has been incorporated into agricultural production systems as part of this process. Agro-industrial complexes have come to dominate the export and import-substitute sectors (Goodman 1989, Grindle 1986).

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<sup>45</sup> Agricultural exports have expanded as a proportion of exports under trade liberalization despite Chile's relatively strong industrial base (FAO, Hojman 1990).

<sup>46</sup> Regional variations in modernization and productivity increases promoted by the federal government have been aggravated by state-level policies. The states of the South and Southeast, particularly São Paulo, have invested heavily in agricultural research, infrastructure, and policy support.

<sup>47</sup> Goodman suggests that "the constant, underlying thread of State policy has been to stimulate the entry of large productive capitals, national and multinational, into all sectors of the food and fibre system." (1989, p.71)

At the same time, extensive use of land for traditional food crops has expanded at the margin. Modernization in the core agricultural areas is directly related to the shifting and expansion of the agricultural frontier through rising land prices, changing labor requirements, and agricultural intensification and specialization. Capital intensification and rising land values were promoted by the opening of international markets for Brazil's expanding non-traditional export crops and the growth of domestic industrial-scale processing. The opening of new frontier lands is closely linked with the increase in seasonal, migrant labor and with rising land values associated with modernization.

Government preferences for large-scale, modern agricultural operations, though pervasive, are only part of the explanation for this phenomenon, which appears to be occurring on a global scale. Expanding international markets create the opportunity for large-scale exports; modernization and mechanization both facilitate marketing and provide the relatively uniform product required by these markets (Twomey and Helwege 1991; Sanderson 1986; Reynolds et al. 1993). The effect of these trends has been magnified by government policies as Brazil sought to take advantage of international markets. Commercial import-substitute crops--wheat and sugarcane--have also become increasingly mechanized because of the scale on which they are produced. In the Center-South, the conjunction of large-scale producers, flat land, suitability for export and import-substitute crops, and government investments have created highly mechanized agricultural systems. The following sections discuss the role of mechanization and inputs in modernization, the question of land reform and capital-intensive development, and the consequences for labor and frontier expansion of this style of intensification.

#### Mechanization and Chemical Inputs

As part of the import-substitution program, industries were established for domestic production of agricultural inputs, first for tractors and equipment and then for fertilizers and chemical inputs (Graham et al. 1987). By the mid-1970s import preferences and tariff exemptions for imported

Table 6.7  
Agricultural Equipment and Inputs

Year	<u>Manufactured fertilizers:</u>			<u>Harvesters:</u>	<u>Tractors:</u>
	Production 1000 MT	Imports 1000 MT	Consumption 1000 MT	Number in Use	Number in Use
1961	126	144	270		
1962	125	131	256		
1963	120	178	298		
1964	108	139	248		
1965	97	182	279		
1966	91	185	276		
1967	138	309	448	23,000	134,500
1968	178	424	602	24,000	145,000
1969	154	477	630	25,000	155,400
1970	225	777	1,002	26,000	165,870
1971	346	777	1,123	27,000	183,500
1972	422	1,214	1,624	28,000	201,000
1973	515	1,164	1,673	29,000	218,500
1974	628	1,197	1,825	30,000	236,000
1975	755	1,223	1,978	31,000	323,113
1976	1,126	1,402	2,528	32,000	312,000
1977	1,354	1,855	3,209	33,000	370,000
1978	1,403	1,825	3,222	34,000	428,000
1979	1,541	2,035	3,567	35,000	485,000
1980	1,967	2,238	4,201	36,000	545,205
1981	1,536	1,221	2,753	37,000	569,000
1982	1,512	1,221	2,729	38,000	593,000
1983	1,584	832	2,287	39,000	617,000
1984	2,089	1,301	3,363	40,000	641,000
1985	1,980	1,224	3,197	41,000	666,309
1986	2,226	1,713	3,782	42,000	680,000
1987	2,255	1,937	3,759	43,000	690,000
1988	2,118	1,586	3,729	44,000	700,000
1989	1,967	1,268	3,383	45,000	710,000
1990	1,896	1,430	3,164	46,000	720,000
1991	1,945	1,590	3,235	47,000	730,000

Source: FAO



agricultural inputs were phased out to provide better markets for the import-substitution industries (Grindle 1986). Economies of scale were achieved in some production, including tractors, but through the 1970s farmers paid relatively high prices for fertilizers<sup>48</sup> and chemicals. These high prices were offset for some farmers by the availability of subsidized credit, reflecting the government's conflicting goals of stimulating supply and consumption (Brandão and Carvalho 1991a). Most phosphate fertilizer and a large percentage of nitrogen fertilizer are now domestically produced, amounting to about one-half of fertilizer consumption (World Bank 1982).

Brazil began using substantial amounts of fertilizer in the 1950s (table 6.7), and use expanded fourteenfold between 1960 and 1980.<sup>49</sup> The stock of tractors, the best measure of mechanization, also grew rapidly.<sup>50</sup> Tractor prices began declining in the 1970s as import-substitution efforts came to fruition, eventually becoming internationally competitive (World Bank 1982). The increase in fertilizer use was largely a result of falling costs relative to product prices in the early 1970s<sup>51</sup>; the situation was reversed after 1974 when world fertilizer prices rose rapidly with petroleum prices.<sup>52</sup> As of the late 1970s, 75% of fertilizers were used for six crops: soybeans, sugarcane, wheat, coffee, rice, and corn (Brandão and Carvalho 1991a). Regionally, fertilizer and tractor use is concentrated in the Center-South. According to the 1985 agricultural census, the regional break-down for fertilizer use was North,

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<sup>48</sup> Domestic fertilizer production is expensive because of high transport costs, lack of off-season markets, lack of natural gas supplies, and the low phosphate content of local stone (World Bank 1982).

<sup>49</sup> Consumption of fertilizer expanded at 19% annually 1967-79 and at less than 1% annually in the 1980s (FAO). Other chemical inputs expanded, though data is scarce. By 1981 Brazilian farmers were using 6% of world sales of spray pesticides and insecticides (Grindle 1986).

<sup>50</sup> The stock of tractors grew 11% per year between 1967 and 1979 but only 3% between 1980 and 1991 (FAO). The average size of tractors grew as well. Between the agricultural censuses of 1950 and 1985, the number of tractors per 1000 ha rose from 0.44 to 12.45; tractors per 1000 workers rose from 0.76 to 28.02; and workers per 1000 ha fell from 576 to 444 (World Bank 1994).

<sup>51</sup> After 1966, concessional loans were available for purchase of fertilizer (Brandão and Carvalho 1991b).

<sup>52</sup> The government responded with a heavy subsidy (40%) for fertilizer purchases (World Bank 1982).

4%; Northeast, 13%; Southeast, 60%; South, 63%; Center-West, 37% (Baer 1995). The 1980s saw only a limited increase in fertilizer use and slow growth of the stock of tractors. The easy availability of frontier lands has reduced the incentive for substantial investment in agricultural research (Alves and Contini 1988). Research efforts for domestic crops were increased in the late 1970s, but production of improved seeds<sup>53</sup> has been limited to a few crops, primarily corn, rice, wheat, and soybeans. Most notably, new soybean varieties allowed expansion of large-scale agriculture into the *cerrado* of the Center-West (World Bank 1994).

### The Land Reform Question

Sectoral and macroeconomic policies have had greater impact on land tenure, land markets, and rural labor than policies that have sought to address land tenure more directly. Examples include support for mechanization, high inflation, credit subsidies, and the gradual enforcement of labor laws, all of which have increased capital intensity and worsened the position of small farmers in the market (Binswanger and Elgin 1989). Distribution of land and income in Brazil is highly skewed, even in comparison with the rest of South America, creating a highly dualistic agricultural sector. The size distribution of farms provides a useful indicator of this dualistic structure. As of 1985, farms of less than 10 ha accounted for more than 50% of total farms, up from 34% in 1950 (Baer 1995), but only about 3% of total farm area. Just 1% of farms occupied 44% of total farm area. The largest number of small farms are found in the Northeast; the largest average farm size occurred in the Center-West, where farms over 1000 ha account for about 70% of total farm area. The median farm size (World Bank 1994) for the nation was 8.3 ha, but only 3.1 ha in the Northeast, and 20 ha in the South and Southeast.<sup>54</sup>

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<sup>53</sup> Improved seeds are mainly the result of work at EMBRAPA (the national agricultural research agency).

<sup>54</sup> Public land occupied by squatters is primarily in the North, Northeast, and Center-West. The stock of public lands is estimated at about 57 million ha, primarily in the North, either unoccupied or occupied by illegal squatters. "Discrimination", the process of sorting out public land ownership, was halted in 1988 (World Bank 1994).

With the exception of import-substitutes, domestic food crops are largely produced by small farmers. Staple production in Brazil has traditionally been relegated to marginal, abandoned, or frontier lands, for example tenant farming or sharecropping on large estates (Barkin et al. 1991). This domestic sector has benefited little from modernization and mechanization, and would probably benefit most from improved land distribution and access to agricultural resources. The ICMS (*Imposto sobre Operações Relativas ao Circulação de Mercadorias*), essentially a value-added tax, is the among the most important tax distortions in the sector discriminating against raw agricultural exports, against small farmers<sup>55</sup>, and against poor, largely agricultural states (World Bank 1994).<sup>56</sup>

Arguments for land reform have often assumed that the "backwardness" and traditional character of agriculture on large landholdings slows production growth (e.g., Furtado 1971) and that better land distribution will improve production as well as providing social benefits and expanding the domestic market. The development of the modern agricultural sector in Brazil has disproved the generalizations about the backwardness of large estates, at least in the Center-South, as it has disproved theories about poor responsiveness to prices. The equity and domestic market arguments for land reform remain, however, and the environmental change attributable to land-hungry agricultural laborers provides another strong justification.

Although the argument that abundant land and labor would work against modernization and technical change in Brazil (Schuh 1970) was widely accepted by policy-makers, in Brazil this has not proved to be the case, at least in the Center-South. This suggests that the anti-agriculture bias of ISI policies was more important than the backwardness of the sector in defining development (Baer 1995).

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<sup>55</sup> Because small farmers rarely keep sufficient accounts, they are unable to collect reimbursements under the drawback system, of which large farmers are able to take advantage (World Bank 1994).

<sup>56</sup> Since the ICMS on agriculture provides a substantial share of state revenues in these states it tends to be set higher than in more industrial states thus discouraging agricultural production in those states most dependent on agriculture. In the early 1990s, for example, the ICMS was set at 12% in Goiás and 7% in São Paulo (World Bank 1994).

The more traditional Northeast, however, has been much slower to adopt modern agricultural techniques. The traditional nature of agriculture in the Northeast is closely linked with its concentration in traditional crops and the relative abundance of smallholdings; whether it has failed to modernize as rapidly as the Center-South because of its advantage in producing traditional crops, or disadvantage in producing export or import-substitute crops, or traditional crops have been relegated to the Northeast because the region has failed to modernize remains an open question.

Ironically, measures purportedly designed to improve land distribution and the rights of agricultural laborers have often had exactly the opposite effect. Land reform was on the table before the military takeover in 1964 as rural workers gained political voice. In fact, pressures for reform were part of the rationale for the takeover. In response, the 1964 Land Statute provided instruments for regularizing ownership and improving land use<sup>57</sup>, but the Statute did little to improve land distribution. Although it ostensibly provided stronger rights to tenants, the Statute made tenancy arrangements less attractive to land owners by increasing their obligations to workers, and so reduced access for tenants, sharecroppers, and squatters (Barkin et al. 1991). Subsequently, the availability of credit for capital investments allowed land-woners to further reduce their labor requirements. Goodman argues that, in the view of the government, "the industrialization of agriculture was infinitely preferable to land reform as a solution to low productivity" (p.60). In the 1970s, colonization programs served as a substitute for land reform, but these efforts faltered in the 1980s for many reasons, including the high cost to the government, unsuccessful agricultural practices, and international pressure. The possibility of reform was revived with the writing of the 1988 Constitution, but again has had little result. Most recently, the extension of the Social Security tax to the agricultural sector, which has raised the real wage substantially

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<sup>57</sup> Policy instruments included regularization of titles, colonization, expropriation, and a rural land tax. This progressive land tax established under the *Estatuto de Terra* was intended, as a substitute for land reform, to induce large unproductive farmers to sell to small farmers. However, the progressivity of the tax was generally reduced through exceptions.

for formal sector workers, has created a further incentive for use of informal-sector, temporary workers and capital-intensive development (World Bank 1994).

### Land Prices and Markets

Effects on land prices, attributable to macroeconomic instability and government policies favoring large farmers and export and industrial crops, have been important determinants of land distribution. In the 1960s and 1970s the value of subsidized credit was capitalized into land prices.<sup>58</sup> Real returns to land were greater than for most financial assets because of the credit subsidy (Brandão and Carvalho 1991a). In the 1980s, when credit was restricted, high inflation and unstable monetary and price policies spurred demand for real assets, sustaining land prices above productive values (World Bank 1994). High inflation and unpredictable economic programs, for example the freezing of financial assets under the Collor Plan, have continued into the 1990s. While the implicit taxation of agricultural production through the 1970s and 1980s should have depressed land values, credit subsidies and the minimum price program offset this impact of exchange rate and industrial policies to an extent, varying with the commodity, region, and time period.<sup>59</sup> High land prices have further undermined the position of small farmers because of their limited access to tax and credit benefits, and because high prices have made it difficult for them to increase landholdings. Macroeconomic stability is needed for reform of land markets but it will not eliminate the dualistic nature of the sector, which is both structural and policy-related.

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<sup>58</sup> Land values increased rapidly in the late 1960s and early 1970s. Subsidized credit increases land values regardless of the land's productive capacity, especially when that credit can be diverted to other investments (World Bank 1982). Sales value of land in São Paulo increased fourfold between 1966 and 1979, while rental values rose only 61% (Goldin and Rezende 1990).

<sup>59</sup> Other factors affecting land markets include lack of clear titles and high transaction costs (World Bank 1994).

The increase in land prices not only stimulated capital investment in developed agricultural land, but also stimulated expansion at the frontier by creating an incentive to increase land stocks and by increasing investment in land-clearing machinery (Rezende 1991, Schneider 1992).<sup>60</sup> High land prices in the export-producing regions not only induced large landholders to invest at the frontier but also played a role in driving small farmers to the frontier. Small farmers could obtain larger parcels of land at lower prices, or through squatting, when they either sold or lost their land in the developed regions (Ozorio de Almeida 1992, Schneider 1992). Some discussions of frontier expansion suggest that much of the frontier expansion was based on financial speculation in land values rather than on productive capacity of the land or intentions to invest in productive activities (Mahar 1989, Binswanger 1989). In either case, the process creates a ripple effect that leads to further opening of the frontier.<sup>61</sup>

#### Falling Labor-Intensity and Labor Displacement

Government policy, in addition to failing to implement land reform, actively encouraged a modernization process and export-orientation that displaced labor. Even as agricultural land area has expanded, the inequality of land distribution has worsened and corporate and large-scale, mechanized farming has increased. Production has increased as labor requirements have fallen.<sup>62</sup> Modernization has generally worsened labor problems and reduced production of domestic food staples (Grindle 1986, Sanders and Ruttan 1978). Government policies and modernization that have displaced workers contributed to this concentration of land and reorientation of production. Mechanization in established

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<sup>60</sup> Rezende (1991) points to this frontier expansion as a positive effect of rising land prices, since land-clearing increases the stock of agricultural land and agricultural capital once and for all.

<sup>61</sup> Rezende (1991) holds that, whether due to speculation or productive value, high land prices will increase productive investments by professional farmers, and thus increase production. Rezende speculates that perhaps the modernization of agriculture in the 1970s, as well as the expansion into the *cerrado* and the rise in investment and research, was sparked by the fourfold increase in land prices between 1972 and 1975.

<sup>62</sup> Productivity measured as output per worker has tripled since 1950, but is still only half of industrial productivity.

agricultural areas has allowed for expansion of the area under cultivation. This exploitation of the internal frontier often incorporates land that was previously allocated to sharecroppers or other tenants (Grindle 1986). Equity investment in land by non-farmers, related to high land values, especially in the Northeast and Center-West, has also reduced labor employment. Land tenancy through sharecropping, renting, and squatting has occupied smaller and smaller land parcels in recent decades (World Bank 1994). Public expenditures as well as taxes continue to favor large enterprises. Although the volume of credit has been reduced, it has if anything become more concentrated<sup>63</sup>, and support to small farmers through extension services has been weakened by the fiscal crisis (World Bank 1994).

Export crops began to displace food crops in the traditional agricultural areas of the South and Southeast, and then in the Center-West, with particularly rapid change in the 1970s. Land ownership became increasingly concentrated in these regions as credit subsidies favored mechanization. The traditional labor market, based on a variety of tenancy arrangements, was replaced by a market based on temporary labor (e.g., the *bóias frias*) as a result of mechanization, new crops<sup>64</sup>, rising land prices, and new production patterns (Goodman and Redclift 1977, Goodman 1989, Ozorio de Almeida 1992).<sup>65</sup> The increase was largest in the South. Rapid urbanization has decreased the relative size of the agricultural labor force, but has not absorbed the labor displaced by modernization.<sup>66</sup>

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<sup>63</sup> Even the Special Funds for the North and Northeast created by the 1988 Constitution have given credit mainly to large farmers and industry (World Bank 1994).

<sup>64</sup> Goodman and Redclift (1977) present estimates of the permanent/seasonal labor requirements of the following crops as, cotton 1:44; oranges 1:8, and coffee 1:2.

<sup>65</sup> Data on temporary vs. permanent labor are poor but substantiate the trend toward use of temporary labor. Temporary laborers rose from 3.9 million in 1967 to 6.8 million in 1972, with a corresponding drop in permanent labor (Grindle 1986, Goodman 1989). Ozorio de Almeida (1992) reports an increase from 15% to 24% of wage labor as a share of agricultural employment between 1970 and 1980.

In São Paulo an estimated 288,000 resident agricultural laborers in 1955 fell to 32,000 in 1969; an estimated 226,000 temporary laborers in 1964 rose to 350,000 in 1970. In Paraná about 150,000 workers were displaced when coffee was replaced by livestock (Grindle 1986).

<sup>66</sup> Urban populations increased very rapidly, from 45% of the population to 77% between 1960 and 1990 (World Bank). The agricultural labor force fell from 60% to 30% of the economically active population. Other sectors, however, could not absorb these populations (Barkin et al. 1991).

### Transfers and the Agricultural Sector

One approach to understanding the government's role in promoting forms of agricultural production is to look at the level of direct and indirect transfers to and from the sector in the government budget and the whole economy. Considering the government budget, the government extracted revenue from the agricultural sector between 1965 and 1973, averaging 3.1% of GDP, according to a study by Brandão and Carvalho (1991a)<sup>67</sup>, as agriculture was used to support the development program. After 1974 there was a sharp increase in government expenditure for agriculture as a share of total expenditure. Between 1974 and 1983, the government had average net expenditures for the sector of 2.4% of GDP, peaking at 8.1% of GDP in 1980. It appears that the government was supporting agriculture with net payments in order to boost export earnings and import substitution.

Considering all transfers to and from the agricultural sector, not just government budgetary expenditures and receipts but also the effects of indirect and direct intervention<sup>68</sup>, the sector enjoyed positive transfers for every year except 1974, averaging 8% of sectoral GDP. This positive transfer was a result of subsidized credit. If the credit subsidy is not considered, net transfers to the sector were negative. Because the positive transfer depended on subsidized credit, it did not reach beyond a small group of privileged farmers and commodities. As compensation for other policy biases against agriculture, the credit policy was ineffective for many producers (Brandão and Carvalho 1991a). The cost of subsidized credit was inflation; the benefit was increased agricultural resources to meet the foreign exchange gap.

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<sup>67</sup> The study looks at the period 1965 to 1983; more recent figures have not been calculated. The government had net expenditures on agriculture between 1960 and 1964 (Brandão and Carvalho 1991a).

<sup>68</sup> The study considered policies on exportables and importables, fertilizer policies, subsidized rural credit, and income taxes and government investments.



Brandão and Carvalho (1991a) explain changes in agricultural sector policies in terms of the conflicting government objectives of foreign exchange, cheap food, and industrialization. They state,

Although the government adopted a goal of generating foreign exchange through agricultural exports, other objectives (such as protecting domestic industry and controlling inflation) outweighed the foreign exchange objective. This explains export embargoes, taxes, and import contingencies for products in demand in the industrial sector, such as sugar, cotton, and soybeans. (1991a, p.94).

This statement ignores the fact that most of these objectives are related to external pressures on the economy. The push for industrialization was initially a response to a felt dependence on industrial imports and an unstable agricultural export base with which to balance increased imports. The later push for exportable processed agricultural products reflects the understanding that industrial exports are a better and more reliable source of export earnings than raw commodity exports; the push for import substitution in agriculture reflects the need to reduce imports of food and energy, a need which became more pressing in the 1980s. One can be optimistic about the current turn to liberalized exports in Brazil because, under the policies of the last thirty years, Brazil has built up a sizeable industrial and manufacturing base with which it can balance increased imports. This has come at the expense, however, of large expansions of agricultural and pasture land, the environmental costs of which were not considered.

### Trade and Agriculture

Agriculture has been central to the external relations of the Brazilian economy. Rather than benefiting from protection from international markets, as the industrial sector has, the agricultural sector has frequently served as the primary buffer against foreign exchange pressures. The export capacity of the sector has been important in ensuring an inflow of foreign exchange for imports and debt service. But its role in Brazil's trade relations has not been limited to export earnings. Agriculture has also served to promote industrialization and to reduce import requirements, both efforts to reduce exposure to

international markets. The form of development created by this use of agriculture has been based on extraction of resources from the sector, either for export or for domestic use, in order to "subsidize" promotion of development of other sectors. In response to varying international and domestic pressures on the economy, policies have focused on promoting extraction of agricultural products alternatively for domestic use or export without regard for the impact on resources or on the rural population. The response to trade pressures and to domestic policy interventions can be expected to vary from crop to crop and region to region, depending on the effect at the farm level. Nevertheless, as is shown in this chapter and Chapter 7, these pressures have led to large-scale changes in agricultural production as numerous producers are pushed in the same direction.

In most developing countries, as in Brazil, industry has been favored over agriculture (Schiff and Valdés 1992, Krueger 1992). Agro-processing has been favored over basic agricultural production. Efforts at export expansion have not altered this pattern of internal terms of trade. In the case of Brazil, the stacking of policy against agriculture has proven effective in catalyzing development of a strong industrial sector that not only meets many domestic needs but also competes internationally. Industrial exports surpassed agricultural exports in 1986, under the policies geared to industrial expansion.

Agricultural exports have fallen as a share of exports to 25%, but have expanded rapidly both in terms of dollar values and physical volume. The external terms of trade determine the growth of value relative to volume expansion, and determine the physical expansion of agriculture necessary to meet foreign exchange requirements. External terms of trade tell us about the exchange relationship of domestic products to external products, not directly about the internal relationship between exportables and domestic consumption goods. The internal relationship favors export goods because of the demand for foreign exchange. The government has at times favored exports through policy to promote generation of foreign exchange, at times has favored domestic production to lower industry costs and to reduce imports, thus using policy filters to magnify or reverse international pressure. Environmental

factors have outlined the range of possible agricultural responses, but the shift away from agricultural exports has depended on government efforts to expand industrial capacity. The construction of industries dependent on agricultural inputs, however, has accelerated the shift to capital-intensive, input-intensive agriculture. The large domestic market did not foster modernization in traditional staples. Rather modernization has occurred in non-traditional foodstuffs.

The balance of trade in agriculture, including both imports of agricultural products and agricultural inputs, has been positive. The emphasis on production for export and on cheap food has required imports of some agricultural products, particularly wheat, and in poor harvest years Brazil has to import traditional staples, including beans and rice. Nevertheless, the agricultural sector produces a large surplus for export. This exported surplus represents an export of real resources in several senses. Most obviously, over the last decade when Brazil has been exporting to cover the costs of the debt, agricultural exports represent a loss of real resources as lands are converted to new uses and often degraded. Second, given that the price of agricultural products does not incorporate the environmental costs of production, the value of exported goods is understated. Finally, insofar as foreign exchange is overvalued because of pressure created by the foreign exchange gap, tradeable agricultural resources have a value in terms of foreign exchange that exceeds the domestic value. These pressures underlie changing land-use patterns.

## CHAPTER 7

### CHANGING AGRICULTURAL LAND-USE PATTERNS

The expansion, modernization, and more limited intensification of agricultural production have substantially changed the agricultural map of Brazil. The evolution of agricultural patterns reflects clearly the continued pressures for expansion of agricultural output and for employment of agricultural labor. Patterns in expansion and modernization of agricultural production, and in expansion of the frontier, are shaped by changing international pressures and changing government efforts to modify Brazil's relationship with those markets through the agricultural sector. Crop production responds to international opportunities and government policy interventions. However, the establishment of infrastructure and processing industries has allowed crop production patterns to withstand shifts in conditions by constructing a comparative advantage in a set of internationally marketable products. Changes in land-use patterns are shaped by the international context and policy responses; however, resource exploitation through expansion and intensification of agricultural land use has remained central to both internally and externally oriented responses. Changes of the three types discussed in Chapter 1--incorporation of new land, intensification of production on existing agricultural land, and cumulative change contributing to biodiversity and ecosystem loss and global climate change--are all evident in Brazilian land-use patterns.

This section takes a twofold approach. After a general look at changes in land use, changes in particular crops and related policies are reviewed. Second, regional shifts in land-use patterns are reviewed to explore the relevance of markets and construction of comparative advantage. A regional analysis of the expansion and changes in crop mix provides some further understanding of the

mechanisms through which pressures and policy affect land use. The final section will examine frontier expansion in recent years, which is the most common source of concern about land-cover change.

### Evolution of Land-Use Patterns

Land-use expansion in the post-War era has been impressive (table 7.1), and its rate belies the diminution of agriculture in the economy over time. Total farm area<sup>1</sup> in 1985 was equal to 44% of Brazilian territory, up by 144 million ha from 1950. The increase in the 1960s was 17%, in the 1970s 25% and, in the first half of the 1980s, 18%. Farm area increased most rapidly in the frontier regions of the Center-West in the 1960s and 1970s and the North in the 1970s and 1980s. Expansion in the internal frontier of the Northeast was also substantial. The two southern regions saw the smallest increases in total farm area, presumably because most lands were already claimed. EMBRAPA estimates that potential agricultural land is about 1.6 times the total farm area reported in the 1985 census, which suggests there is still room for substantial productive expansion. Criteria for estimating potential agricultural land are controversial, however, since potential land includes areas in the Legal Amazon and drought-prone areas of the Northeast.

In terms of total utilized farmland<sup>2</sup>, regional growth followed much the same pattern as growth in total farm area, with rapid expansion in the 1970s and in the Center-West and Northeast, and to a lesser degree in the North. The relatively slower growth of utilized farmland compared with total farmland is best explained by the large-scale incorporation, or claiming, of naturally forested areas that are not (yet) used for agricultural production. Utilized farmland provides a better picture of actual land use, though total farmland suggests the potential for medium-term expansion of production

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<sup>1</sup> Total farm area includes all land incorporated into farms, even unused and naturally forested land.

<sup>2</sup> Utilized farmland includes crop area, natural and planted pasture, and planted trees.

Table 7.1  
Brazilian Land Use (ha)

Region	Total Territory	Total	Utilized	Crop Area	Annuals	Perennials	Planted	Time	Planted
		Farm Area	Farm Area	Farm Area	Annuals	Perennials	Planted	Natural	Planted
North	1950	355,400,200	23,107,917	2,683,595	62,049	172,463	2,344,566	17,732,008	16,671
	1960	355,400,200	23,153,086	2,710,562	103,397	328,505	180,640	17,058,988	58,711
	1970	355,400,200	23,182,144	2,769,599	152,366	481,163	379,045	13,805,502	43,262
	1980	355,400,200	32,015,963	4,564,796	238,115	1,086,354	1,572,994	21,850,502	87,987
	1985	355,400,200	42,546,027	9,682,077	555,271	1,208,287	3,710,740	26,047,033	196,081
Northeast	1950	355,400,200	44,884,352	6,687,077	668,773	1,350,355	3,710,740	26,047,033	196,081
	1960	355,400,200	58,341,458	22,497,358	785,482	4,488,322	2,801,777	14,902,518	247,710
	1970	355,400,200	66,990,438	30,952,142	2,264,592	6,463,108	3,201,347	14,811,667	575,334
	1980	355,400,200	74,297,115	36,298,560	3,977,906	6,344,956	5,751,143	16,651,502	106,489
	1985	355,400,200	78,688,942	41,686,939	3,960,167	7,073,038	6,842,689	17,441,426	31,038
Southeast	1950	355,400,200	89,553,512	48,580,071	4,848,503	9,433,809	10,345,773	19,611,402	139,573
	1960	355,400,200	91,986,500	4,237,139	10,189,741	10,189,741	10,345,773	19,611,402	139,573
	1970	355,400,200	61,736,592	42,423,304	2,841,484	5,606,419	8,481,635	7,197,364	467,600
	1980	355,400,200	64,438,763	48,875,043	3,332,735	6,709,506	9,451,140	6,981,998	717,001
	1985	355,400,200	69,500,951	55,245,306	2,172,974	7,439,430	10,633,300	6,652,194	893,626
South	1950	355,400,200	72,463,938	59,273,839	2,995,435	7,835,135	35,717,641	6,457,194	1,565,485
	1960	355,400,200	73,973,814	58,385,001	3,555,478	8,563,727	27,453,621	8,001,125	2,626,532
	1970	355,400,200	35,420,380	23,525,159	640,009	3,889,568	18,006,436	5,479,097	302,262
	1980	355,400,200	38,993,290	26,891,005	1,910,788	6,233,299	16,850,626	1,376,291	520,001
	1985	355,400,200	43,548,036	33,220,306	1,557,248	9,471,207	17,976,092	3,636,589	579,260
Center-West	1950	355,400,200	46,172,034	35,699,320	1,401,227	11,590,231	16,722,082	4,437,675	948,105
	1960	355,400,200	48,184,988	37,314,962	1,209,150	13,330,968	15,678,715	4,992,112	1,461,388
	1970	355,400,200	48,713,065	891,258	13,735,288	13,735,288	5,634,741	4,999,605	1,461,388
	1980	355,400,200	53,604,728	36,663,480	72,413	535,859	33,174,333	2,787,200	93,675
	1985	355,400,200	59,986,565	43,407,628	185,976	1,179,903	36,981,819	4,868,815	191,115
Brazil	1950	355,400,200	81,705,925	57,925,763	143,570	2,259,357	46,409,854	9,073,694	13,550,298
	1960	355,400,200	93,933,659	65,891,630	188,544	4,161,181	46,020,761	15,289,459	231,685
	1970	355,400,200	115,327,931	74,839,196	328,949	6,151,194	43,000,344	24,665,373	592,326
	1980	355,400,200	127,792,896	4,401,437	7,446,413	14,692,631	14,934,353	54,679,092	1,127,918
	1985	355,400,200	249,862,142	152,836,380	7,797,488	20,914,721	102,209,767	19,852,242	2,662,362
	1975	355,400,200	294,143,871	189,780,144	7,984,064	25,999,715	124,405,933	29,732,397	1,658,125
	1980	355,400,200	302,048,536	208,516,578	8,384,388	31,615,939	125,948,591	39,701,364	67,857,624
	1985	355,400,200	369,586,272	228,801,307	10,497,307	38,687,985	113,897,035	60,602,270	83,151,970
	1990	355,400,200	376,284,964	9,835,301	42,543,030	42,543,030	14,934,353	54,679,092	1,127,918

Source: IBGE, World Bank 1994

Utilized farmland as a share of total farmland varies regionally with the intensity of agricultural production. Shares are higher in the Center-South. Cropland accounts for higher shares in the Southeast, South, and Northeast, while much of utilized land in the Center-West is pasture. The overall share of pasture in utilized farmland has fallen over the period, despite large area increases, as annual crops have expanded even more rapidly. The rise in planted pasture and cropland in the Center-South, and the reduction in natural pasture, clearly reveal the intensification of land use in the region.

Growth rates of export, import-substitute, and domestic crops have varied over the period (tables 7.2, 7.3, figures 7.1, 7.2, 7.3). The land in use for domestic crops expanded more rapidly than export crops between 1955 and 1965 as ISI policies disfavored exports. During the early years of the military regime, the traditional exports--coffee and cotton--declined, although coffee continued to dominate agricultural export earnings until the early 1970s. The non-trationals--soybeans and oranges--took off under export promotion policies in the early 1970s. Expansion of agricultural land for exports took place primarily in the internal frontier<sup>3</sup> in the 1960s and early 1970s. Domestic food crops, apart from corn, were fairly stagnant, reflecting the bias toward the industrial sector, rural-urban migration, and expanding wheat consumption. The beginnings of an increase in domestic crop production in the North were seen after 1964 as the frontier expanded. Between the two oil crises, the growth of non-traditionals and decline of traditional exports continued. Agricultural exports by value increased through the late 1970s, with strong commodity prices providing a boost, particularly for sugar and coffee. Export earnings increased more slowly in the 1980s as import substitutes provided foreign exchange savings, rather than direct earnings. Wheat expansion reflects increasing import-substitution efforts and changing consumption patterns. With the introduction of the Proalcool import-substitution program, sugarcane began to expand, accelerating after 1979. Processed exports increased as a share of

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<sup>3</sup> Peybayle (1980) provides a detailed description of spatial change on the internal frontier in the South.

Table 7.2  
Area Harvested: Growth Rates (%)

	1964-73	1974-79	1980-86	1987-92
Soybeans	28.1	10.0	2.3	-0.5
Oranges	8.7	7.3	4.3	6.2
Cotton	8.6	0.8	-2.0	-4.2
Coffee	-5.8	3.1	1.4	-2.6
Cocoa	-1.5	-1.7	5.6	0.0
Sugarcane	1.8	5.0	7.7	0.0
Wheat	16.1	5.7	3.0	-12.3
Rice	1.5	2.5	-3.3	-7.2
Corn	2.6	1.2	0.9	-0.5
Cassava	2.4	1.3	-1.1	0.6
Beans	2.3	1.0	1.8	-0.9

Source: FAO



Table 7.3  
Total Area Harvested  
1000 ha

Year	Arable & Permanent Crops	Cassava	Dry Beans	Cereals	Rice, paddy	Corn	Wheat	Cocoa beans	Soybeans	Coffee	Sugar cane	Cotton
1961	28396	1381	2581	11169	3174	6886	1022	474	241	4384	1367	2023
1962	28980	1476	2716	11522	3350	7348	743	465	314	4463	1467	2226
1963	29620	1618	2982	12565	3722	7958	793	470	340	4286	1509	2226
1964	30260	1716	3131	13108	4182	8106	734	487	360	3696	1519	2327
1965	30900	1750	3273	14248	4619	8771	767	482	432	3511	1705	2327
1966	31530	1780	3325	13523	4005	8703	717	456	491	3057	1636	2226
1967	32070	1914	3651	14493	4291	9274	831	473	612	2792	1681	3720
1968	32710	1998	3663	15120	4459	9584	970	433	722	2623	1687	3902
1969	33350	2029	3633	15774	4621	9654	1407	438	906	2571	1672	4195
1970	33984	2025	3485	16822	4979	9858	1895	444	1319	2403	1725	4299
1971	35160	2071	3936	17674	4764	10550	2269	448	1716	2390	1728	4460
1972	36340	2053	3971	17468	4533	10539	2320	430	2191	2266	1803	4200
1973	37620	2104	3815	16804	4795	9924	1839	416	3615	2080	1959	4319
1974	38800	2006	4289	18024	4665	10672	2471	509	5143	2155	2057	3631
1975	40001	2041	4146	19310	5306	10855	2932	451	5824	2217	1969	3876
1976	41800	2094	4059	21559	6656	11118	3540	407	6416	1121	2093	3409
1977	43620	2176	4551	21284	5992	11797	3153	413	7070	1941	2270	4097
1978	45430	2149	4617	19860	5624	11125	2811	444	7782	2184	2391	3951
1979	47250	2111	4212	20861	5452	11319	3831	454	8256	2406	2537	3646
1980	49104	2016	4643	21081	6243	11451	3122	483	8774	2434	2608	3699
1981	49750	2067	5027	19894	6102	11520	1920	505	8501	2618	2826	3511
1982	50420	2122	5926	21904	6025	12620	2828	533	8203	1895	3084	3624
1983	51000	2061	4064	18084	5108	10706	1879	591	8137	2346	3479	2926
1984	51680	1816	5320	19502	5351	12018	1742	586	9421	2505	3656	3114
1985	52281	1868	5316	19702	4755	11798	2677	649	10153	2534	3912	3590
1986	53800	2052	5478	22381	5585	12466	3864	656	9182	2591	3952	3160
1987	55350	1936	5202	23455	5980	13503	3456	649	9134	2876	4314	1968
1988	56900	1752	5781	23077	5959	13169	3468	702	10520	2975	4117	2559
1989	58450	1881	5181	21991	5250	12932	3281	660	12211	3027	4076	2126
1990	60000	1938	4680	18512	3947	11394	2681	665	11487	2909	4273	1904
1991	61350	1943	5443	19805	4127	13110	1995	667	9618	2767	4211	1830
1992		1884	5154	20661	4693	13429	1995	670	9419	2510	4207	1828

Source: FAO

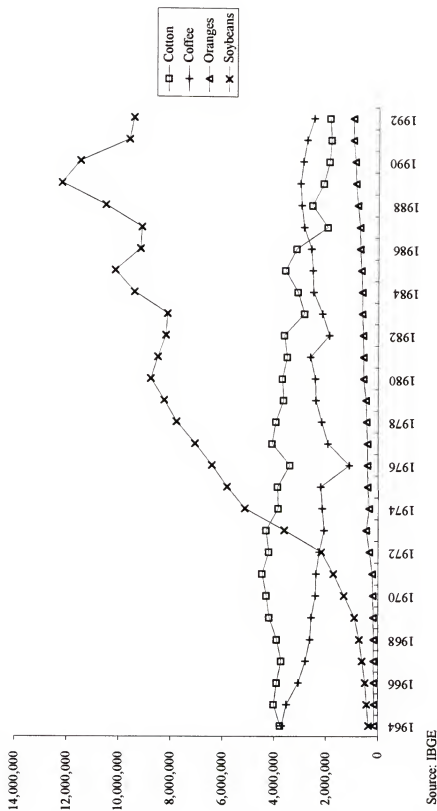


Figure 7.1  
Area Harvested (ha)  
Selected Traded Crops

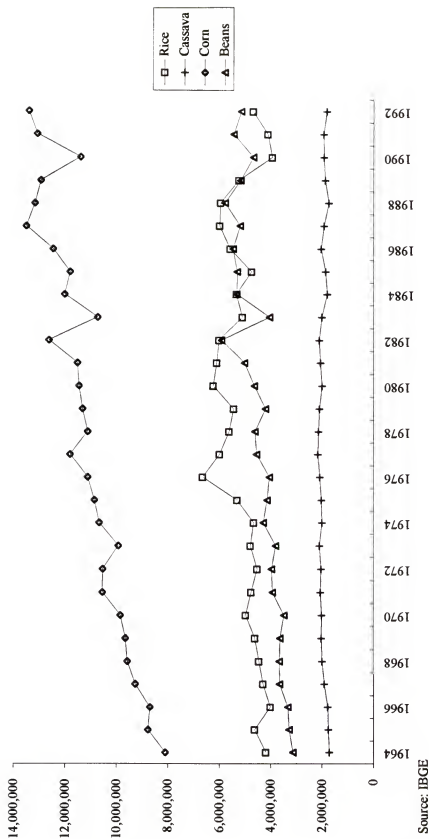


Figure 7.2  
Area Harvested (ha)  
Selected Domestic Crops

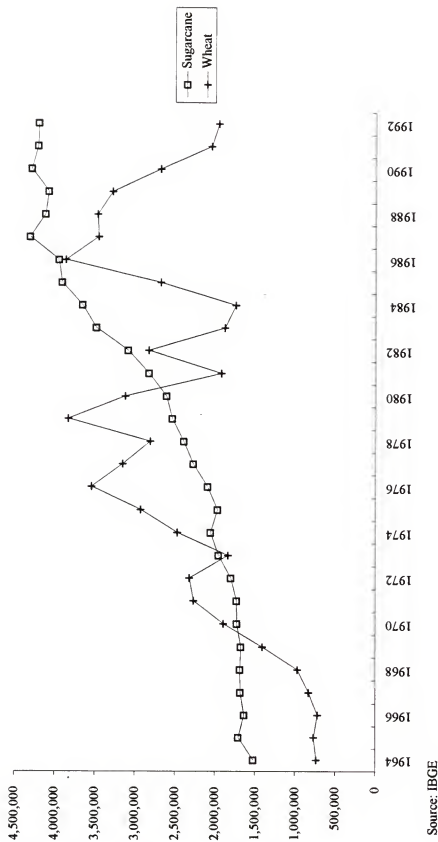


Figure 7.3  
Area Harvested (ha)  
Selected Import-Substitutes

Source: IBGE

agricultural exports, beginning in the late 1960s and more rapidly in the 1970s (table 6.6). Domestic crops affected by modernization and processing industries, including rice and corn, also expanded during these years of crisis. The forced reduction in imports in the early 1980s supported the expansion of import-substitute crops, notably wheat. These crops showed the strongest growth in the 1980s and 1990s, reflecting rising domestic consumption and poor international prices (table 6.4). Liberalization at the end of the decade and improving commodity prices may have prompted the recent increase in export earnings.

Total crop output per capita rose by about 50% between 1960 and 1980, mainly because of the growth of export and industrial crops. Domestic food crops were relatively stagnant with virtually no per capita growth between 1962 and 1980 (Graham et al. 1987). Rice and corn output expanded in the 1980s. Wheat production soared and sugarcane expanded steadily. Traditional exports showed some recovery as non-traditionals continued their expansion.

Brazil's agricultural growth has occurred through the incorporation of new lands (tables 7.1, 7.2). The number of agricultural establishments increased by over 60% in the 1950s, by 50% between 1960 and 1975, and by 17% between 1975 and 1985 (Baer 1995). The area of land under cultivation rose by 175% between 1950 and 1985, reflecting both the occupation of new lands and more intensive use of land on existing farms, i.e., development of the internal frontier. In 1950, 6.5% of land belonging to agricultural establishments was under cultivation; 11.6% in 1970; and 13.9% in 1985 (Baer 1995).

Productivity increases (tons/ha) were minimal from the 1940s to the 1980s. Improved yields contributed to growth for only a few crops up to 1979, while yields declined for cassava, black beans, wheat, and rice. Several studies have pointed to increasing agricultural yields beginning in the 1970s, which appear to account for an increasing share of agricultural production growth (World Bank 1994). Yield increases occurred in export crops in the 1970s, notably oranges, sugar, cacao, and tobacco (Graham et al. 1987). The decline in productivity in domestic crops may indicate that they were pushed

to more and more marginal lands as production was shifted to the new frontier. Alves and Contini (1988), looking at 15 crops from 1973 to 1982, found that yield increased across the period at 4.9% annually while area expansion was only 3.7% annually. Among the 15 crops, however, the change in yields varied greatly. In particular, cotton yields fell substantially in the Northeast because of drought and pests while rising in the Southeast. Bean yields declined in almost all regions, though other domestic crops--potatoes, onion, tomatoes--showed increased yields. Rezende (1989), looking at 11 crops from 1973 to 1988 found a similar pattern. Productivity increases have been concentrated in the Center-South, particularly São Paulo, where use of modern inputs has increased dramatically. While the Southeast has lost some of its share in agricultural income, the Center-South has maintained its share at over 75% (Brandão and Carvalho 1991a).

In order to examine the effect of macroeconomic and sectoral drivers on land use, data on production, area harvested, trade, and international prices have been collected. The data used here on land use and production are generally derived from the Anuario Estatístico do Brasil. These numbers must be considered with a great deal of caution. However, although the numbers may be inexact, it is reasonable to believe that they clearly reflect the national and regional trends in land use and production across the period considered. Some particular problems should be noted. No data were collected for 1971 and 1972; numbers for these years are based on averages of 1970 and 1973 numbers. Data on exports and imports is taken from FAO sources, which are based on Brazilian government reports. Again, these numbers may be imprecise but should clearly reflect trends in trade. The reliability of data on domestic food crops, particularly rice, beans, and cassava, is relatively low given that these are often frontier crops, often intercropped, and often consumed on farm (World Bank 1982). Finally, data collected before 1966 are based on area cultivated; later data are based on area harvested. Land-use figures after 1966, therefore, do not reflect the total land area affected by agricultural planting. Data on total land use are confused by intercropping and double-cropping.

### Traditional Export Crops

Brazil's traditional crops remain an important source of export earnings but have lost their predominant position in the balance of payments. Cotton and coffee production have not expanded over this thirty-year period. Area planted in cotton has declined but improved yields have kept production up. Government policies of reducing dependence on traditional exports are reflected here as well as the relatively labor-intensive nature of their production. International prices for these exports have not fared better or worse than non-traditionals (table 6.4). However, world markets for these products have expanded relatively slowly, providing little scope for expansion of exports.

#### Coffee

The coffee boom of the early 1950s led to over-planting and over-production by the end of the decade.<sup>4</sup> An extensive coffee eradication program was carried out in the early 1960s and new varieties were introduced in an effort to increase productivity of coffee producers while reducing the oversupply. This program resulted in a substantial increase in productivity in coffee, atypical of Brazilian agriculture. The reduction in land area in coffee in the South and Southeast made way for an increase in domestic food production. These areas subsequently were replaced by new export crops--citrus and soybeans (Homem de Melo 1987a). Coffee production has shifted from the South to the Southeast, both as measured by area and quantity produced. Yields (tons/ha) are highest in the Southeast. Sharp falls in production in the South because of cold weather have induced a shift in production toward the Southeast, which now has over 74% of area harvested.

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<sup>4</sup> The coffee cycle of rising prices, increased planting, and over-production has plagued the Brazilian coffee sector since the 19th century. The country's position as a price-setter has meant that over-production lowers international prices unless active measures are taken to control exports.

Table 7.4  
Coffee Production

<u>Area harvested (ha):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	1,212	1,172	1,342	26,661	92,450	167,098	141,510
Northeast	183,837	104,152	77,113	114,661	122,760	160,635	170,849
Southeast	1,866,947	1,224,569	1,165,908	1,581,030	1,816,450	2,055,478	1,855,766
South	1,391,351	1,050,864	943,432	635,930	431,505	426,581	279,169
Center-West	67,732	22,236	29,126	75,322	70,597	99,169	50,056
Brazil	3,511,079	2,402,993	2,216,921	2,433,604	2,533,762	2,908,961	2,497,350
<u>Area harvested (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.1	1.1	3.6	5.7	5.7
Northeast	5.2	4.3	3.5	4.7	4.8	5.5	6.8
Southeast	53.2	51.0	52.6	65.0	71.7	70.7	74.3
South	39.6	43.7	42.6	26.1	17.0	14.7	11.2
Center-West	1.9	0.9	1.3	3.1	2.8	3.4	2.0
<u>Quantity produced (t):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	668	751	915	35,310	116,002	228,109	179,974
Northeast	84,995	68,041	46,235	94,873	130,708	127,274	133,015
Southeast	1,985,375	1,215,152	1,242,335	1,579,846	2,899,178	2,150,783	2,013,675
South	2,392,672	199,068	1,226,715	330,802	589,095	313,821	206,760
Center-West	124,385	26,508	28,396	81,561	86,309	109,724	52,677
Brazil	4,588,095	1,509,520	2,544,596	2,122,392	3,821,292	2,929,711	2,586,101
<u>Quantity produced (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	1.7	3.0	7.8	7.0
Northeast	1.9	4.5	1.8	4.5	3.4	4.3	5.1
Southeast	43.3	80.5	48.8	74.4	75.9	73.4	77.9
South	52.1	13.2	48.2	15.6	15.4	10.7	8.0
Center-West	2.7	1.8	1.1	3.8	2.3	3.7	2.0

Source: IBGE



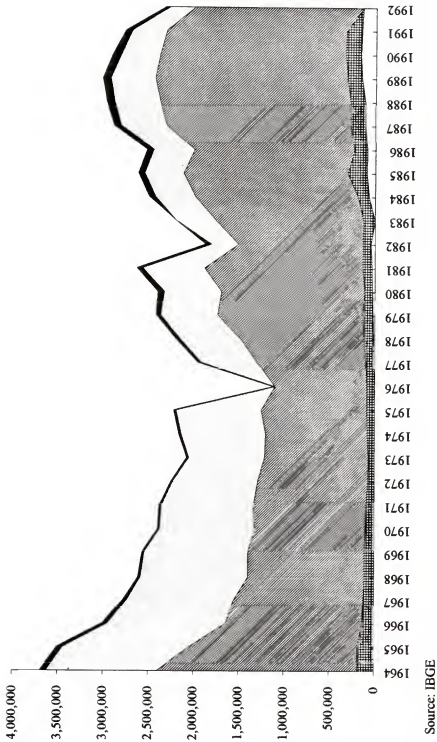
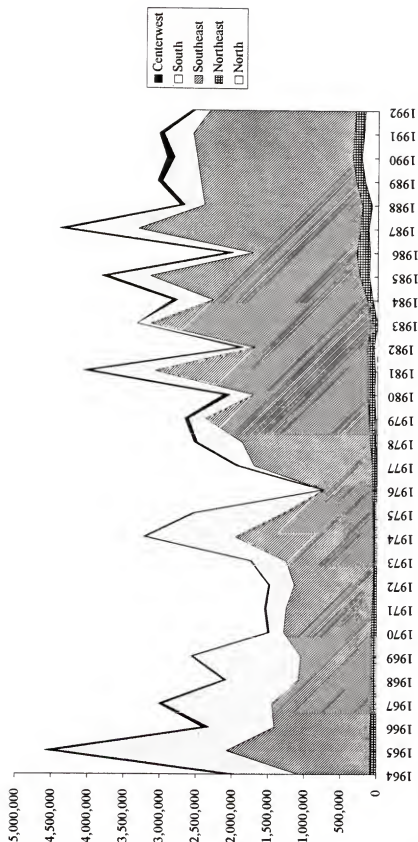


Figure 7.4  
Area Harvested (ha)  
Coffee



Source: IBGE

Figure 7.5  
Production: MT  
Coffee

The area of coffee harvested has fallen by about one third since 1964, and was even lower in the mid-1970s. As a percent of the area harvested of all crops, coffee fell rapidly from over 15% in 1961 to 2.7% in 1976. It has since recovered and maintained a share of about 5%. Overall, coffee production has risen. Coffee exports by volume now stand at about the same level as in the early 1960s, but have been lower through most of the intervening period, especially in the late 1970s when exports fell to about half the current level. Coffee prices were fairly strong from the mid-1970s through 1986, but have fallen by more than 50% since then, in part because of the collapse of the International Coffee Agreement. The dramatic fall of coffee from 60% of agricultural exports to 10% clearly marks the diversification of Brazilian exports away from traditional crops and away from labor-intensive crops.

### Cotton

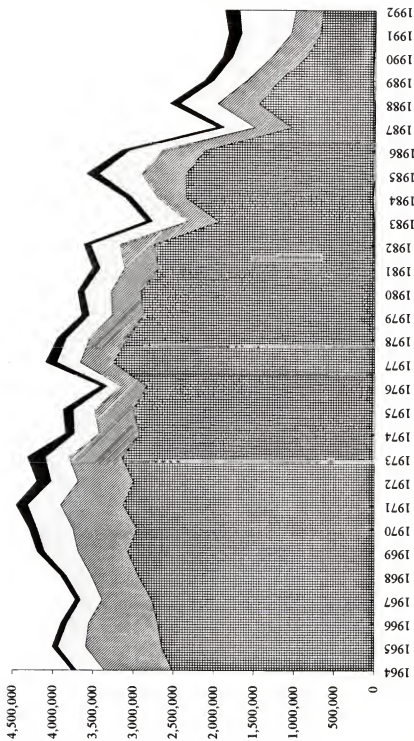
Cotton accounted for about 12% of area in crops through the early 1970s, and has since fallen gradually to a low point of 3% in 1992. Area harvested varied in the range of 3.4 million ha and 4.4 million ha through the late 1960s and 1970s, falling to consistently lower levels in the late 1980s and early 1990s. The largest decrease in area in cotton has occurred in the Northeast and Southeast, while area in the Center-West and North has increased. Area in cotton in the Northeast fell from over 2 million ha in the mid-1980s to less than 1 million ha by the 1990s. The Northeast has fallen from a peak of almost 80% of national area in cotton to just over 34%. Land area in the South has risen to over 37% while the Center-West is approaching 10%.

The quantity produced has fallen very little in comparison with the drop in area, although the quantity produced in the Northeast has fallen to less than a quarter of 1965 production. The South has replaced the Northeast as the main cotton-producing region, and now accounts for 50% of production. The Center-West has also expanded its share, from 3% to over 12% of national production. Exports by quantity have varied substantially, with expansion in the late 1960s and a large fall in the second half

Table 7.5  
Cotton Production

<u>Area harvested (ha):</u>	1965	1970	1975	1980	1985	1990	1992
North	2,321	906	501	4,952	5,408	17,082	7,462
Northeast	2,641,646	2,953,390	3,001,721	2,904,832	2,350,029	841,861	643,632
Southeast	942,997	797,179	479,268	373,166	547,119	430,699	341,315
South	348,138	447,413	267,000	336,000	540,000	490,000	704,498
Center-West	69,342	99,685	127,899	80,545	147,624	123,951	180,941
Brasil	4,004,444	4,298,573	3,876,389	3,699,495	3,590,180	1,903,593	1,877,848
<u>Area harvested (percent of national total):</u>	1965	1970	1975	1980	1985	1990	1992
North	0.1	0.0	0.0	0.1	0.2	0.9	0.4
Northeast	66.0	68.7	77.4	78.5	65.5	44.2	34.3
Southeast	23.5	18.5	12.4	10.1	15.2	22.6	18.2
South	8.7	10.4	6.9	9.1	15.0	25.7	37.5
Center-West	1.7	2.3	3.3	2.2	4.1	6.5	9.6
<u>Quantity produced (t):</u>	1965	1970	1975	1980	1985	1990	1992
North	597	205	413	3,362	2,116	13,232	9,973
Northeast	852,819	516,915	642,466	384,024	647,342	189,558	189,731
Southeast	723,573	807,789	575,104	589,759	927,265	574,572	476,041
South	349,940	525,772	377,695	561,519	1,035,661	852,600	972,804
Center-West	59,384	104,312	152,466	137,220	244,184	191,447	236,691
Brasil	1,986,313	1,954,993	1,748,144	1,675,884	2,856,568	1,821,409	1,885,240
<u>Quantity produced (percent of national total):</u>	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	0.2	0.1	0.7	0.5
Northeast	42.9	26.4	36.8	22.9	22.7	10.4	10.1
Southeast	36.4	41.3	32.9	35.2	32.5	31.5	25.3
South	17.6	26.9	21.6	33.5	36.3	46.8	51.6
Center-West	3.0	5.3	8.7	8.2	8.5	10.5	12.6

Source: IBGE



Source: IBGE

Figure 7.6  
Area Harvested (ha)  
Cotton

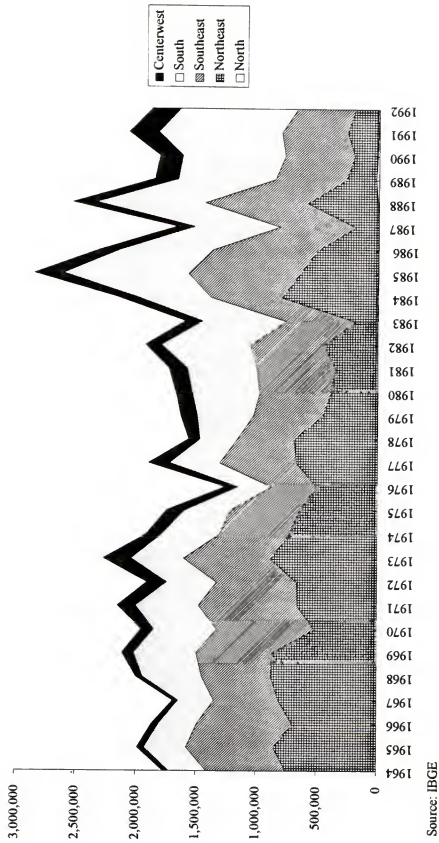


Figure 7.7  
Production: MT  
Cotton

of the 1970s through most of the 1980s. Domestic processing was supported by channelling raw cotton to producers at low prices (Graham et al. 1987). As a consequence, exports of cotton fiber and woven cotton increased beginning in the mid-1970s (table 6.5). Higher levels of exports have not been consistent through the late 1980s and early 1990s.

### Non-Traditional Exports

The two striking features of the growth of the non-traditionals considered here are their rapid expansion and the location of production. Both soybeans and oranges have benefited from strong links to agro-industry and government promotion efforts. Their contribution to export earnings has risen rapidly. Oranges are produced predominantly in the Southeast, already a developed, export-producing region. Soybeans expanded from traditional export regions in the South to the Center-West, creating a frontier in the Center-West based on large-scale export production, very different from the frontier of the North.

#### Soybeans

Soybeans stand out because of their dramatic expansion and because of their large contribution to export earnings (table 6.3, 6.5). Soybeans are also notable for the high degree of mechanization of production, and the consequent labor displacement. Beginning in the late 1960s, increases in area of soybeans cultivated and increases in output dominated agricultural growth in Brazil. Many coffee and cotton producers began to move into soybean production in the late 1960s as poor international prices continued for these crops (Graham et al. 1987). Brazil's share in world soybean production grew rapidly, from 9% in 1970-74 to 14% in 1976-78 when a US export embargo in 1973 gave Brazil access to new markets (World Bank 1982). Productivity increased at 5% per year from 1966 to 1977, reflecting the geographical shift in production to Paraná, São Paulo, and the Center-West from Rio Grande do Sul.

Table 7.6  
Soybean Production

Area harvested (ha):

	1965	1970	1975	1980	1985	1990	1992
North	0	0	0	0	811	4,640	0
Northeast	511	16	757	1,986	72,217	376,814	341,122
Southeast	6,349	63,731	467,197	723,156	944,156	1,119,587	937,294
South	424,170	1,241,369	5,106,658	6,918,703	6,253,673	6,149,829	4,890,982
Center-West	804	13,693	249,880	1,130,178	2,882,548	3,836,433	3,266,293
Brasil	431,834	1,318,809	5,824,492	8,774,023	10,153,405	11,487,303	9,435,691

Area harvested (percent of national total):

	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northeast	0.1	0.0	0.0	0.0	0.7	3.3	3.6
Southeast	1.5	4.8	8.0	8.2	9.3	9.7	9.9
South	98.2	94.1	87.7	78.9	61.6	53.5	51.8
Center-West	0.2	1.0	4.3	12.9	28.4	33.4	34.6

Quantity produced (t):

	1965	1970	1975	1980	1985	1990	1992
North	0	0	0	0	677	9,252	0
Northeast	1,058	25	709	2,320	86,198	225,502	504,029
Southeast	8,976	91,892	765,656	1,388,600	1,840,113	1,685,994	1,827,847
South	512,387	1,397,811	8,780,627	11,856,126	10,688,811	11,500,593	9,437,367
Center-West	755	18,812	346,016	1,908,758	5,662,786	6,476,663	7,415,676
Brasil	523,176	1,508,540	9,893,008	15,155,804	18,278,585	19,898,004	19,184,919

Quantity produced (percent of national total):

	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northeast	0.2	0.0	0.0	0.0	0.5	1.1	2.6
Southeast	1.7	6.1	7.7	9.2	10.1	8.5	9.5
South	97.9	92.7	88.8	78.2	58.5	57.8	49.2
Center-West	0.1	1.2	3.5	12.6	31.0	32.5	38.7

Source: IBGE





Figure 7.8  
Area Harvested (ha)  
Soybeans

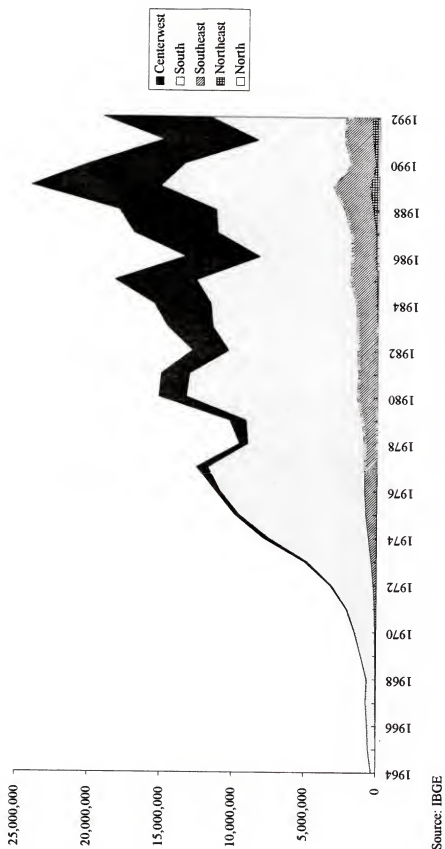


Figure 7.9  
Production: MT  
Soybeans

Exports grew from literally zero in the early 1970s and jumped spectacularly in the second half of the 1970s, peaking in the early 1980s at over 1 million tons. Export value peaked in 1984 and 1985 and has since fallen to about half that value, reflecting falling prices and increased domestic consumption. Soy-oil exports were very strong in the late 1980s and early 1990s (table 6.5). Soybeans have usurped the place of coffee as predominant export crop.

Area harvested has expanded more evenly, peaking in 1989 and since falling slightly. The expansion of soybeans occurred in every region. Production was almost entirely concentrated in the South in the early 1960s, expanding into the Southeast and Center-West in the 1970s, and even into the North and Northeast in the late 1980s. Beyond the remarkable growth of the sector, the most striking change is the shift in production from the South to the Center-West. Although output in Rio Grande do Sul expanded sixfold in the 1970s, its share in total production fell substantially. Production in the Center-West rose from less than 1% of area in 1965 to almost 34% in 1992, entailing an expansion from about 800 ha to almost 4 million ha in 1990.

Although soybeans and processed soy products were developed as exports, domestic consumption has become very important. Soybean oil accounts for a large share of domestic consumption of edible oils. Price controls at the retail level have boosted consumption (World Bank 1990). Soymeal, the byproduct, is used heavily by the feed industry. The discrepancies between export expansion and area expansion are best explained by the increasing domestic use of soy products.

Processed soy exports (table 6.5) grew more rapidly than other exports beginning in the late 1960s. By the late 1970s soymeal and soy-oil accounted for 42% of all processed agricultural exports, up from 5% in 1967 (World Bank 1982), and raw soybean exports fell. Brazil's comparative advantage in processed soybean products was created by government policies supporting agro-industrial development. While it may be that more foreign exchange would have been generated by export of raw soybeans (Brandão and Carvalho 1991b), soy-oil prices have fared as well as soybean prices. Brandão

and Carvalho (1991b) find that negative protection for soybeans may have limited their expansion. They estimate that production levels in 1983 were almost 40% below what they would have been under "free trade" policies<sup>5</sup>, despite the rapid expansion.

### Citrus

Like soybeans, citrus production is closely linked with agro-processing industries, because it is exported as juice concentrate. While the area planted with orange trees is small relative to other crops considered here, the crop is interesting for a variety of reasons: first because of its rapid expansion; second because of its earning potential as a processed export (table 6.5); and third because it is an expanding perennial crop in a period when annuals were displacing traditional perennials, namely coffee. The area in perennial crops has grown only 25%, from 7.6 million ha in 1961 to 9.6 million ha in 1990, and has been falling in recent years.

The expansion of orange production has affected all regions, but has occurred predominantly in the Southeast. Area harvested in the Southeast expanded from 107,000 ha in 1965 to 851,000 ha in 1992, accounting for over 86% of the total area in oranges nationally. The share of the South has fallen from over 16% to less than 4%. Production expanded slowly through the 1960s and 1970s and then expanded more rapidly and steadily through the 1980s and early 1990s. The quantity produced nationally has grown at about the same rate as the expansion in area, up from about 11 million tons in 1965 to 98 million tons in 1992.

Orange juice exports rose rapidly in value and volume in the late 1970s and early 1980s (table 6.5). Value rose from US\$ 1.8 million in 1964 to over US\$ 1 billion in the mid- and late 1980s, volume

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<sup>5</sup>Brandão and Carvalho (1991b) also find that wheat production was consistently constrained by government interventions, and that rice production was constrained after 1974.

Table 7.7  
Orange Production

<u>Area harvested (ha):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	1,426	1,364	1,819	2,574	3,774	8,695	8,752
Northeast	13,443	21,348	30,016	49,082	55,790	73,789	84,019
Southeast	107,044	149,384	332,531	489,986	571,789	792,458	851,686
South	24,612	26,236	34,663	29,796	27,777	32,176	34,465
Center-West	3,732	3,705	4,163	3,811	3,933	5,878	6,896
Brasil	150,257	202,037	403,192	575,249	663,063	912,996	985,818
<u>Area harvested (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.9	0.7	0.5	0.4	0.6	1.0	0.9
Northeast	8.9	10.6	7.4	8.5	8.4	8.1	8.5
Southeast	71.2	73.9	82.5	85.2	86.2	86.8	86.4
South	16.4	13.0	8.6	5.2	4.2	3.5	3.5
Center-West	2.5	1.8	1.0	0.7	0.6	0.6	0.7
<u>Quantity produced (t):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	115,400	133,394	159,001	248,830	356,138	799,689	958,817
Northeast	1,043,062	1,572,521	2,385,874	4,623,615	5,087,690	6,628,820	7,374,328
Southeast	7,923,286	11,227,335	25,781,888	46,697,558	62,982,593	76,925,594	86,343,506
South	2,038,793	2,235,648	2,948,651	2,582,115	2,352,386	2,840,613	3,056,318
Center-West	307,081	328,300	290,440	306,954	292,726	407,891	537,140
Brasil	11,427,622	15,497,198	31,565,854	54,459,072	71,071,533	87,602,607	98,270,109
<u>Quantity produced (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	1.0	0.9	0.5	0.5	0.5	0.9	1.0
Northeast	9.1	10.1	7.6	8.5	7.2	7.6	7.5
Southeast	69.3	72.4	81.7	85.7	88.6	87.8	87.9
South	17.8	14.4	9.3	4.7	3.3	3.2	3.1
Center-West	2.7	2.1	0.9	0.6	0.4	0.5	0.5

Source: IBGE



Figure 7.10  
Area Harvested (ha)  
Oranges



Source: IBGE

Figure 7.11  
Production: MT  
Oranges

from about 50,000 tons in the late 1970s to over 1 million tons in 1993. Exports of unprocessed oranges by quantity fell in the 1960s and remained low through most of the 1970s and 1980s.

### Import-Substitute Crops

The two import-substitute crops discussed here, sugar and wheat, have shown the most interesting response to changing pressures and policies. The two are import substitutes of very different kinds. Sugar is a traditional export crop which has served as the basis for a new fuel-substitution industry. Wheat has traditionally been imported. However, both meet needs that have been largely created by recent development that has adopted the energy-intensity and consumption habits of developed countries.

### Sugar and the Proalcool Program

Brazil is the world's largest and lowest-cost producer of both sugarcane and sugar. The sugar-based sector provides about 1.5% of Brazil's GDP and 15% of value-added in agriculture, and employs about one million people, despite its capital-intensive nature (World Bank 1994). Sugar has traditionally been an export crop for Brazil, although in recent decades it has accounted for only a small portion of exports. The crop's trade importance has been primarily as an import-substitute in recent years.

The Proalcool program was necessitated by the large dependency on foreign oil that Brazil's capital-intensive, energy-intensive industrialization path created. While one of the ostensible goals of import-substitution policies was to reduce such dependencies, in fact, Brazil's reliance on imports was not reduced (Cardoso 1980). As was the case for other oil importers, this dependence suddenly became problematic in 1974. The Proalcool program was expressly intended to alleviate balance of payments problems through import-substitution in fuels, particularly automotive fuels. It is one of the most



Table 7.8  
Sugar Cane

<u>Area harvested (ha):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	11,410	16,272	15,469	9,828	6,789	25,696	8,494
Northeast	585,008	625,207	766,054	1,025,888	1,330,122	1,476,285	1,363,932
Southeast	931,280	915,581	1,059,891	1,417,965	2,208,369	2,357,091	2,371,017
South	133,864	125,854	104,433	112,815	195,775	206,980	234,639
Center-West	43,519	42,207	23,380	41,132	170,987	221,063	223,222
Brasil	1,705,081	1,725,121	1,969,227	2,607,628	3,912,042	4,287,115	4,201,304
<u>Area harvested (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.7	0.9	0.8	0.4	0.2	0.6	0.2
Northeast	34.3	36.2	38.9	39.3	34.0	34.4	32.5
Southeast	54.6	53.1	53.8	54.4	56.5	55.0	56.4
South	7.9	7.3	5.3	4.3	5.0	4.8	5.6
Center-West	2.6	2.4	1.2	1.6	4.4	5.2	5.3
<u>Quantity produced (t):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	283,548	342,363	458,124	458,402	404,905	545,948	414,393
Northeast	24,885,960	26,900,395	34,227,672	47,935,479	67,645,059	71,689,378	68,723,345
Southeast	43,337,740	45,586,850	51,894,882	91,514,905	155,730,571	162,444,052	171,797,689
South	5,524,017	5,019,078	4,033,312	6,491,421	12,477,514	13,630,374	15,468,383
Center-West	1,821,602	1,904,250	910,569	2,250,356	10,941,425	14,364,398	15,028,093
Brasil	75,852,867	79,752,936	91,524,559	148,650,563	247,199,474	262,674,150	271,431,903
<u>Quantity produced (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.4	0.4	0.5	0.3	0.2	0.2	0.2
Northeast	32.8	33.7	37.4	32.2	27.4	27.3	25.3
Southeast	57.1	57.2	56.7	61.6	63.0	61.8	63.3
South	7.3	6.3	4.4	4.4	5.0	5.2	5.7
Center-West	2.4	2.4	1.0	1.5	4.4	5.5	5.5

Source: IBGE



Figure 7.12  
Area Harvested (ha)  
Sugarcane



Figure 7.13  
Production: MT  
Sugarcane

ambitious attempts to reduce dependence on foreign fuel through an alternative energy source.<sup>6</sup> The program, introduced in 1975 and expanded in 1979, included subsidies to ethanol producers, car manufacturers, and consumers (Rask 1995). Supply controls and price-setting have been used for ethanol and sugar on the domestic market, and exports have been restricted (World Bank 1994).

The impact of the program's incentives on sugarcane production have been substantial, with production almost tripling since 1975. The combination of new distilleries, production incentives, and low world sugar prices created a sixfold increase in alcohol production between 1975 and 1979 alone (World Bank 1982).<sup>7</sup> Growth in ethanol production has been halted since 1986, and production levels maintained rather than increased (World Bank 1994). Now that Brazilian policies have created a large fleet of ethanol-powered vehicles, ethanol supplies and low prices must be maintained. A dependence on government provision of cheap energy resources has been developed. Seventy-five percent of cars run on either pure alcohol or an alcohol-gas mix; ethanol was the primary fuel for over 85% of the cars sold between 1984 and 1989 (Rask 1995).

Sugarcane production expanded through the 1970s. Area harvested and overall production reflect changes in the sector. Area harvested has more than doubled since 1961, reaching over 4 million ha in the late 1980s, more than 7% of cropped area, with the largest increases between 1975 and 1985. Production has shown a similar pattern. Initial expansion of sugarcane production took place in western São Paulo and northern Paraná (World Bank). The advantages of the Center-South over the North and traditional Northeast in production of sugarcane lie in climate, topography, and technology (Rask 1995). The flat, arable land of the Center-South favors mechanization and large-scale cultivation, and gives the South flexibility in increasing and decreasing sugarcane planting in areas where alternative crops--

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<sup>6</sup> Of the several components of the II PND designed to change transport patterns, the Proalcohol program was the most effective (Batista 1993).

<sup>7</sup> Currently there are about 700 distilleries with capacity to produce 16 billion liters of ethanol annually (Rask 1995).

soybeans, for example--can be grown. The North and Northeast, however, have few alternative crop possibilities. Steady improvements in yields were obtained in the Center-South<sup>8</sup>, while yields in the traditional sugarcane producing area of the Northeast were constant.

The regional shift in land area under sugarcane toward the Center-South has been much smaller than the shift in quantity produced. The Northeast expanded its share of land area slightly in the 1970s, with the initial phase of Proalcool, and then lost it again to the South and Center-West. Quantity produced has almost quadrupled, up from 75 million tons in 1965 to 271 million tons in 1992, again with the largest expansion between 1975 and 1985. The Southeast has seen the largest increase in productivity per hectare while the Northeast has fallen behind. The Northeast had 34% of area and 33% of production in 1961 and now has 33% of area and only 25% of production. In both regions, however, the area expansion has been significant.

Sugar is still an important export crop (table 6.3), despite the increase in domestic use, for several reasons. Proalcool was based on the premise that oil prices would remain high and sugar prices low, neither of which proved to be the case in the short-term. Moreover, Brazil discovered substantial oil reserves. The rapid rise in international sugar prices in the early 1970s greatly increased export earnings from the sector. The share of sugarcane earnings in total export earnings rose from 4% in the mid-1960s to 17% in the mid-1970s, and to over 27% of agricultural exports. Supply also responded strongly, with a volume increase of 47% over the period. Export earnings from the sector fell again in the late 1970s as prices fell and export volumes were restricted by the Proalcool program. Earnings recovered in 1980 with the rise in international prices and an increase in refined sugar exports. Exports of refined sugar have increased as a share of total sugar exports. Processed sugar exports rose from 1%

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<sup>8</sup> The technological improvements that have raised sugarcane productivity in the Center-South are the result of a research program to develop suitable varieties of cane (Rask 1995).

of volume and value to over 40% of volume and value by the late 1970s (World Bank 1990), close to the levels of raw sugar exports<sup>9</sup>, where they remained through the 1980s.

Debate over the Proalcool program has focused on two sets of issues, whether alcohol production is economically efficient, and whether increased sugar production has supplanted food crop production. The production of alcohol fuel from sugarcane has generally been found to be inefficient.<sup>10</sup> Barzelay and Pearson (1982) stress the point that alcohol production costs have been substantially above the international price of oil, once the "social" costs of the Proalcool program are factored into production costs. Rask (1995) draws similar conclusions but finds that domestic ethanol costs in the Center-South did fall below foreign fuel costs between 1983 and 1985.<sup>11</sup> In light of the hypotheses that imports are determined by foreign exchange earnings (Leff and Delfim Netto 1994), and that import substitutes have a higher "value" than non-tradeables (Chapter 3), the relevancy of comparing domestic costs with international prices is clearly reduced. The question that goes unasked in both the Rask and the Barzelay and Pearson studies is whether, given Brazil's aim of lowering foreign exchange requirements, the Proalcool program was the most efficient way to lower those requirements, either in economic or environmental terms.<sup>12</sup> Their economic analyses do not consider the foreign exchange benefits of import-substitution or the limitations on expansion of exports. The scarcity of foreign exchange may reduce the relative costs of ethanol production (Batista 1993). Given Rask's findings that ethanol production was cost-effective in those years when the debt crisis was at its worst, the Proalcool

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<sup>9</sup> Brazil is unusual among developing countries in this respect.

<sup>10</sup> Studies of the sugar and alcohol sector have been carried out by Barzelay and Pearson (1982), the World Bank (1980), and Rask (1995), among others.

<sup>11</sup> Falling costs resulted in large part from falling labor costs in sugarcane production (Rask 1995).

<sup>12</sup> Graham et al. (1987) suggest, for example, that the land absorbed by sugar expansion could have generated more foreign exchange if it had been used for export agriculture. It is not clear what export crop could have countered the rising cost of fuel in poor international commodity markets.

program can be seen as providing a valuable service in reducing foreign exchange requirements.<sup>13</sup> However, it has not reduced Brazil's dependence on cheap fuel supplies or encouraged fuel conservation.

Whether the Proalcool program had the effect of lowering domestic food production is difficult to determine in the absence of a counter-factual case. It can be said with some certainty, however, that expansion of sugarcane production displaced food production in the developed regions. Frontier expansion can be linked with the displacement of labor in areas of expanding cane production, especially in the Center-South where extensive mechanization is possible.

Interestingly, the main value of ethanol fuel substitution now seems to lie in its unintended environmental advantages. Alcohol-powered cars produce 57% less carbon monoxide, 64% less hydrocarbons, 13% less nitrogen oxides, and no lead, in comparison with gasoline-powered cars (Rask 1995, World Bank 1994). However, these environmental advantages must be weighed against the land-use changes which have occurred directly and indirectly because of expanded sugarcane production. Moreover, serious concerns have been voiced about toxic emissions from alcohol fuels. Fundamental questions must be raised about Brazil's choice of an energy-intensive development path, as they must for all countries.

The effect of internal liberalization of sugar and ethanol markets would probably be an increase in sugar production relative to ethanol. The effect of international liberalization of sugar and ethanol markets on Brazilian production patterns is more difficult to predict. Brazil has restricted exports of sugar and ethanol under the Proalcool program. However, large distortions in international markets limit expansion of Brazilian sugar and ethanol exports at least in the short-term. US, EC, and Japanese sugar policies, as well as the US controls on ethanol imports all impose heavy costs on Brazil's exports (World

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<sup>13</sup> One proposed measure of the efficiency of import-substitution production is the domestic resource cost (DRC), which would establish the real value of the domestic resources required per unit of foreign exchange earned or saved. DRCs would provide a way of measuring domestic costs of foreign exchange without reference to international prices. Unfortunately data are not generally available for establishing DRCs. Teital and Thoumi (1986) provide a useful discussion of the potential of DRCs.

Bank 1994). If Brazil entered into the international sugar market on a large scale, there would be a strong downward pressure on already low sugar prices; however, the growing demand for ethanol for uses other than automotive fuels, based on environmental policies, might make Brazil's ethanol producers internationally competitive. Ethanol production costs, while still above production costs for gasoline, have fallen substantially since the beginning of the Proalcool program. So far, Brazil has failed to take advantage of these environmental benefits on international markets. Certainly, however, production under liberalization would be reoriented toward export markets, and overall sugar production would increase since producer prices have been set below international prices.<sup>14</sup> Nevertheless, the comparative advantage which Brazil has constructed in ethanol production may eventually support a strong export industry.

#### Wheat

Wheat stands alone among the crops considered here, in that it has traditionally been an imported crop. Wheat policy has been based on the goals of self-sufficiency, inflation control, and low food costs. These goals have been in conflict, as price incentives to producers necessarily raise food costs or government spending. The government has been very heavily involved in the wheat sector, setting producer and consumer prices and acting as the only buyer and seller of both imported and domestic wheat. Government support promoted increased domestic production in an effort to reduce imports.<sup>15</sup> However, policies to keep consumer wheat prices low raised consumption faster than production. The increase in consumption of wheat can also be attributed to the expansion of the urban population and the imitation of developed country consumption patterns. High levels of imports have

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<sup>14</sup> World Bank estimates suggest that exports of sugarcane products would increase from 3 million tons to more than 20 million tons, even with the induced fall in world prices (World Bank 1994).

<sup>15</sup> Although wheat producers received substantial credit, given low productivity and high risks in wheat production the producer subsidy was probably low (World Bank 1982).



Table 7.9  
Wheat Supply

Year	Agricultural	Wheat		Imports 1000 MT	Supply 1000 MT
	Imports 100 000\$	Imports 100 000\$	Production 1000 MT		
1961	2,040	1,389	545	1,887	2,432
1962	2,450	1,610	706	2,200	2,605
1963	2,635	1,640	392	2,186	2,879
1964	3,003	2,096	643	2,623	3,266
1965	2,112	1,359	585	1,890	2,476
1966	2,707	1,699	615	2,426	3,041
1967	3,182	1,808	629	2,501	3,131
1968	3,384	1,826	856	2,656	3,312
1969	3,025	1,620	1,374	2,386	3,559
1970	2,955	1,287	1,844	1,997	3,842
1971	3,174	1,245	2,011	1,740	3,751
1972	3,818	1,412	983	1,812	3,195
1973	7,596	3,769	2,031	2,962	4,593
1974	11,179	5,223	2,859	2,413	4,844
1975	8,529	3,570	1,788	2,117	4,692
1976	11,123	5,475	3,216	3,435	5,635
1977	9,250	2,953	2,066	2,626	5,590
1978	15,461	6,012	2,691	4,336	6,118
1979	23,613	6,305	2,927	3,658	6,430
1980	24,709	10,513	2,702	4,759	6,489
1981	21,867	9,622	2,210	4,363	6,696
1982	17,961	8,520	1,827	4,225	6,744
1983	14,651	8,049	2,237	4,182	7,243
1984	15,032	8,409	1,983	4,869	7,425
1985	13,656	6,606	4,320	4,049	7,082
1986	24,694	2,806	5,690	2,255	7,089
1987	14,398	2,932	6,035	2,760	7,223
1988	10,554	1,111	5,738	953	7,282
1989	22,277	2,363	5,553	1,309	6,969
1990	22,692	3,308	3,094	2,219	6,659
1991	27,638	5,500			
1992	25,855	7,500			

Source: FAO

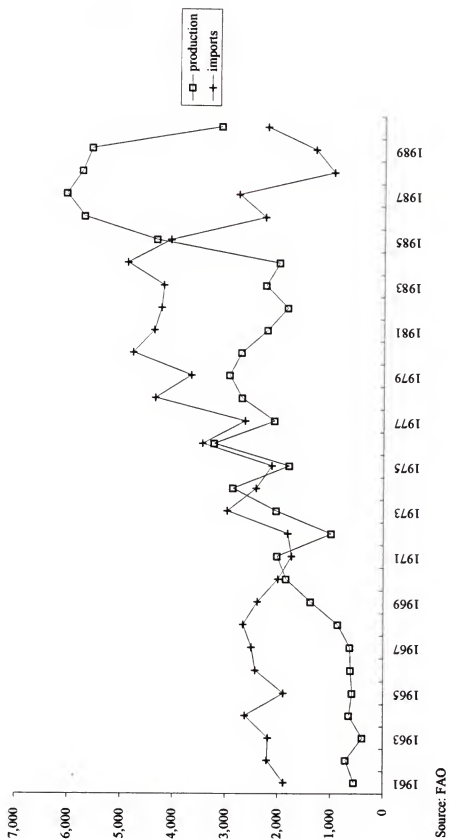


Figure 7.14  
Wheat Supply  
(1000 MT)

Source: FAO

Table 7.10  
Wheat Production

Area harvested (ha):

	1965	1970	1975	1980	1985	1990	1992
North	0	0	0	0	0	0	0
Northeast	0	0	0	0	0	0	0
Southeast	5,234	19,610	123,300	188,948	162,453	205,067	71,442
South	760,241	1,874,979	2,766,699	2,810,898	2,312,674	2,290,828	1,744,485
Center-West	1,165	660	41,509	122,261	201,598	185,094	141,821
Brasil	766,640	1,895,249	2,931,508	3,122,107	2,676,725	2,680,989	1,957,748

Area harvested (percent of national total):

	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northeast	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southeast	0.7	1.0	4.2	6.1	6.1	7.6	3.6
South	99.2	98.9	94.4	90.0	86.4	85.4	89.1
Center-West	0.2	0.0	1.4	3.9	7.5	6.9	7.2

Quantity produced (t):

	1965	1970	1975	1980	1985	1990	1992
North	0	0	0	0	0	0	0
Northeast	0	0	0	0	0	0	0
Southeast	5,393	19,303	70,830	216,176	308,924	217,562	110,661
South	578,532	1,824,051	1,708,384	2,375,282	3,692,803	2,670,968	2,567,658
Center-West	1,459	909	8,966	110,155	318,540	205,261	117,660
Brasil	585,384	1,844,263	1,788,180	2,701,613	4,320,267	3,093,791	2,795,979

Quantity produced (percent of national total):

	1965	1970	1975	1980	1985	1990	1992
North	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Northeast	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Southeast	0.9	1.0	4.0	8.0	7.2	7.0	4.0
South	98.8	98.9	95.5	87.9	85.5	86.3	91.8
Center-West	0.2	0.0	0.5	4.1	7.4	6.6	4.2

Source: IBGE

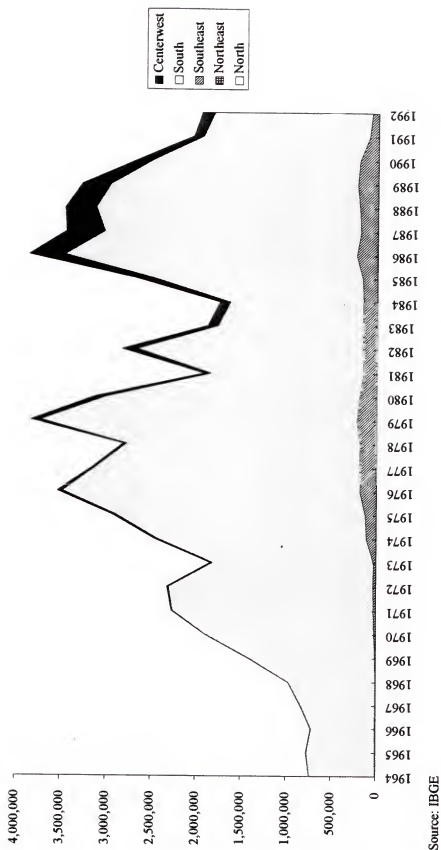


Figure 7.15  
Area Harvested (ha)  
Wheat

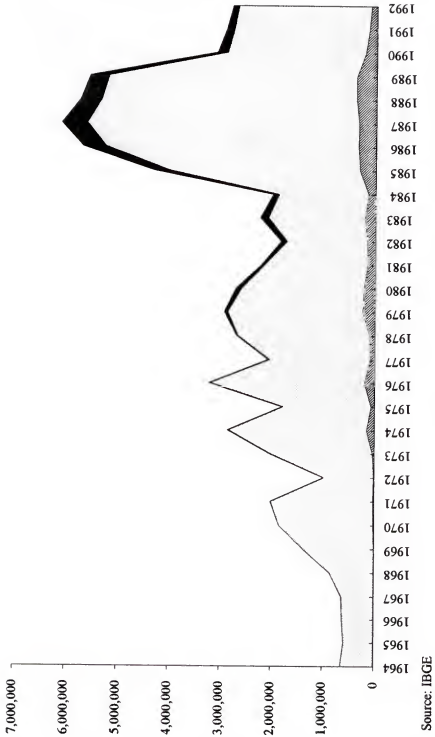


Figure 7.16  
Production: MT  
Wheat

been required despite increases in domestic supply.<sup>16</sup> Wheat consumption per capita, which had been stable at about 30 kg annually in the 1960s rose to 50 kg by the late 1970s; consumption fell to 41 kg by 1990 (FAO). With the crises of the 1980s, wheat imports were reduced substantially by value, from over US \$1 billion in 1980 to about US \$1 million by 1988. Volume of imports fell more slowly, reflecting falling prices. Domestic wheat production expanded strongly after 1984, to new high levels. While much of the reduction in imports in the 1980s was achieved through manufactures, the import-substitute crops played an important role in meeting the foreign exchange gap. Production collapsed in the early 1990s with liberalization. In 1991, the government wheat policy was overhauled, ending the monopoly on purchases and sales and reducing producer subsidies (World Bank 1994).

Wheat has expanded not only because of subsidies to production but also because it can be cropped in the soybean off-season. It is well adapted to mechanization and so allows for more economic use of the equipment required for soybean production. Wheat production has not expanded as rapidly as soybean production, although much of its growth has been explained as an effect of soybean expansion (e.g. Barkin et al. 1991, Baer 1995). Area harvested remains about one-fifth of the area in soybeans. Several factors may explain this. First, wheat is a difficult crop to grow in Brazilian conditions, and requires heavy inputs.<sup>17</sup> Second, the soybean and wheat seasons are not perfectly matched; producing a crop of both entails lowering the productivity of one or the other, since one season must be curtailed (World Bank 1990).

Production is almost entirely in the South, the traditional wheat-growing area. Rio Grande do Sul produced 93% of national production in 1968. Although wheat expanded in the 1970s into Paraná

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<sup>16</sup> Brazil imported wheat from the US under the PL 480 program from the early 1950s until 1970, which covered about 30% of wheat imports and substantially lowered the wheat import bill. Low import prices provided support for Brazil's consumer and producer subsidy programs in wheat (Hall 1985).

<sup>17</sup> "The crop is not ideally suited to ecological conditions in Brazil, and the technology of production, especially the combatting of pests and diseases, is very demanding." (World Bank 1982, p.42)

and, to a lesser extent, into São Paulo and Mato Grosso paralleling the expansion of soybeans, the South still has 89% of the area in wheat. Area in wheat has been variable, with the annual changes of over 20% common and often ranging above 50%, with most extensive area harvested in the 1970s and the second half of the 1980s. Area in wheat peaked in 1978 and 1986 at over 3.8 million ha, up from 734,000 ha in 1964. These annual changes are greater than for any other crop considered here and far greater than in cereals as a whole. During the years of extensive harvests wheat rose to between 7% and 8% of total area in crops. Wheat productivity has been low and variable, especially in the traditional wheat growing area of Rio Grande do Sul. There have been wide annual variations in production because of weather, pests, and disease. Production has varied over 100% in several years. Increases in area harvested do not always result in increases in production and vice versa. In the 1980s, area planted fell, but yield increased, suggesting that marginal lands were removed from production. These patterns would suggest that wheat is poorly adapted to Brazil.

### Domestic Food Crops

While food production increased fairly steadily but slowly through the 1960s and 1970s, some food crops performed better than others and regional production patterns changed significantly. Beans (figure 7.2) and especially cassava performed poorly, with production of cassava showing virtually no increase after 1969. Cereals and edible oils, e.g. soybeans and wheat, did much better, doubling between 1966 and 1983 (Brandão and Carvalho 1991b). Until 1966, food production kept pace with demand; between 1966 and 1977 it fell behind.<sup>18</sup> Low consumer prices for wheat, besides working against policy goals of self-sufficiency, also reduced consumption of traditional staples as the relative prices of corn, cassava, and other staples rose (World Bank 1982). Imports of agricultural products began to rise substantially in 1973. Agricultural imports were reduced in the early 1980s, rose again briefly under the

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<sup>18</sup> Demand here is measured in terms of prices.

expansive influence of the Cruzado Plan, and have risen again to the levels of the late 1970s with the recent round of liberalization.

Some crops have benefited because they have become increasingly part of the modern agro-industrial sector. This is true in the case of corn. Domestic demand for corn has risen sharply with the growth of the pork, poultry, and feed industries. These new industries are dependent on domestic corn production and require feed imports when domestic production falls short (Brandão and Carvalho 1991b). Rice production has risen with the expansion of irrigated rice. Increasingly, production of rice and corn has expanded in the Northeast and frontier regions of the Center-West and North, and has shifted away from the population centers of the Center-South. Production of cassava has declined in the developed, export-oriented regions while expanding in other regions. These areas are generally the least productive, with the lowest yields per hectare even in domestic crops.

### Rice

The area in rice expanded over the period, peaking in the mid-1970s and early 1980s. As a percent of area in crops, rice ranged around 13% to 14% from the mid-1960s through mid-1970s and then fell to about 10% to 11% through the 1980s, falling again to about 7% in the 1990s. Area in rice in the Southeast, which was the primary rice-producing area in 1965, has fallen quite steadily over the period 1965 to 1992. The largest expansion of area has occurred in the North and Northeast, with area in the Northeast close to doubling and in the North more than tripling. Expansion in the Northeast occurred primarily in the 1970s, and in the North in the late 1970s and 1980s.

Quantity produced has also shifted regionally, although there has been little overall increase. Quantity produced in the Southeast has fallen by more than half, with most of the fall in the early 1970s. Productivity in the South has increased dramatically, reflecting the expansion of irrigated rice production. While the South has only about 25% of the area in rice it provides more than 50% of Brazilian rice. No



Table 7.11  
Rice Production

<u>Area harvested (ha):</u>	1965	1970	1975	1980	1985	1990	1992
North	81,582	102,497	186,591	270,422	289,691	253,394	305,368
Northeast	679,677	763,042	889,214	1,275,185	976,379	1,049,865	1,210,542
Southeast	1,774,321	1,712,837	1,422,165	956,620	907,105	693,508	672,936
South	909,096	979,141	1,086,360	1,143,048	1,065,131	1,001,293	1,175,433
Center-West	1,174,222	1,421,648	1,721,940	2,597,863	1,516,386	947,631	1,322,684
Brasil	4,618,898	4,979,165	5,306,270	6,243,138	4,754,692	3,945,691	4,686,963
<u>Area harvested (percent of national total):</u>	1965	1970	1975	1980	1985	1990	1992
North	1.8	2.1	3.5	4.3	6.1	6.4	6.5
Northeast	14.7	15.3	16.8	20.4	20.5	26.6	25.8
Southeast	38.4	34.4	26.8	15.3	19.1	17.6	14.4
South	19.7	19.7	20.5	18.3	22.4	25.4	25.1
Center-West	25.4	28.6	32.5	41.6	31.9	24.0	28.2
<u>Quantity produced (t):</u>	1965	1970	1975	1980	1985	1990	1992
North	77,027	101,610	245,088	388,789	408,677	344,897	450,316
Northeast	964,820	856,002	1,292,059	1,483,538	1,138,697	855,288	834,488
Southeast	2,545,660	2,411,504	1,424,996	1,395,856	1,556,854	1,029,603	1,211,873
South	2,029,049	2,347,585	2,946,965	3,360,254	3,949,764	4,015,377	5,471,472
Center-West	1,963,093	1,836,382	1,872,430	3,147,283	1,970,563	1,175,566	1,993,750
Brasil	7,579,649	7,553,083	7,781,538	9,775,720	9,024,555	7,420,931	9,961,899
<u>Quantity produced (percent of national total):</u>	1965	1970	1975	1980	1985	1990	1992
North	1.0	1.3	3.1	4.0	4.5	4.6	4.5
Northeast	12.7	11.3	16.6	15.2	12.6	11.5	8.4
Southeast	33.6	31.9	18.3	14.3	17.3	13.9	12.2
South	26.8	31.1	37.9	34.4	43.8	54.1	54.9
Center-West	25.9	24.3	24.1	32.2	21.8	15.8	20.0

Source: IBGE

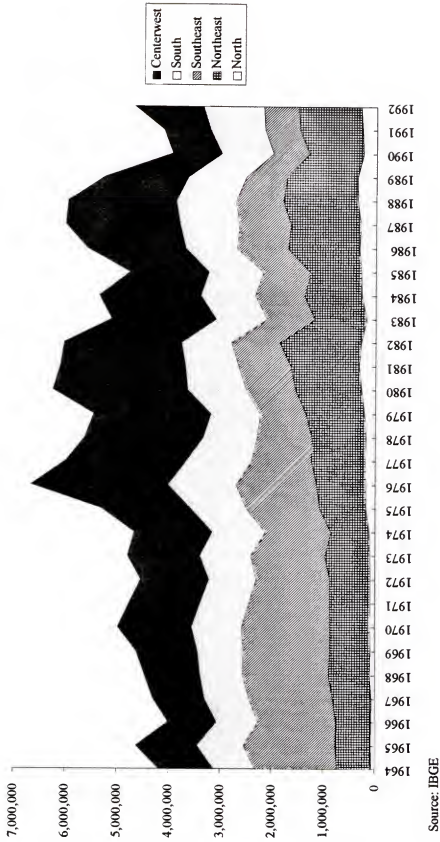


Figure 7.17  
Area Harvested (ha)  
Rice

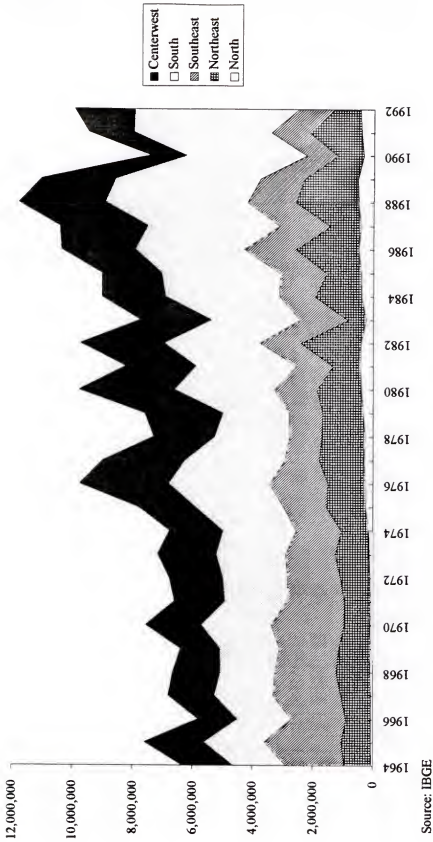


Figure 7.18  
Production: MT  
Rice

other region competes now with the South in terms of production per hectare. Quantity produced in the frontier North expanded primarily in the late 1970s, as did area harvested.

### Cassava

Cassava and beans are among the staple food crops most neglected or disadvantaged by government policies. Both crops are produced predominantly on small farms with traditional methods. For cassava, area harvested expanded in the 1960s and remained just over 2 million ha through the mid-1980s, after which it fell slightly. As a percent of area in crops, cassava also expanded in the 1960s to about 6%, and has fallen slowly but steadily since 1970, to just over 3% in the 1990s. Production also expanded in the 1960s, peaking between 1968 and 1972, and then fell slightly through the 1980s. Current production is close to production levels in the mid-1960s.

Expansion of area has occurred in the North and Northeast, while area harvested has been reduced in the Southeast, South, and Center-West. Area in the North has tripled since 1970 while area in the Northeast has increased by about half. The share of the North in cassava area rose from about 5% in the 1960s to 10% in 1980 and to 16% in 1990, coincident with the expansion of modern export agriculture. Area in the Southeast has fallen by more than half, from 18% in 1965 to about 9% in the 1980s. The South likewise saw a fall in share from 22% in 1975 to 13% in 1980, though it has since recovered slightly. Quantity of production has shifted along similar lines. The Northeast has lower yields than any of the other regions, although it has the largest area planted in cassava. The South in particular has increased productivity.

### Corn

Corn, a traditional staple, has recently become an industrial crop, as use for animal feed has expanded. Area in corn has expanded, inconsistently, since the early 1960s, and peaked in the late

Table 7.12  
Cassava Production

<u>Area harvested (ha):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	88,658	98,619	145,041	207,942	277,041	325,637	295,733
Northeast	778,289	995,418	1,107,117	1,293,021	1,042,836	1,108,617	1,069,810
Southeast	315,567	314,013	245,071	194,243	171,437	137,354	128,254
South	465,548	518,871	451,805	260,916	301,844	290,916	260,354
Center-West	101,898	97,636	92,382	59,735	74,922	75,043	72,068
Brasil	1,749,960	2,024,557	2,041,416	2,015,857	1,868,080	1,937,567	1,826,219
<u>Area harvested (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	5.1	4.9	7.1	10.3	14.8	16.8	16.2
Northeast	44.5	49.2	54.2	64.1	55.8	57.2	58.6
Southeast	18.0	15.5	12.0	9.6	9.2	7.1	7.0
South	26.6	25.6	22.1	12.9	16.2	15.0	14.3
Center-West	5.8	4.8	4.5	3.0	4.0	3.9	3.9
<u>Quantity produced (t):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	1,317,657	1,393,635	1,742,685	2,609,615	3,703,017	4,240,937	3,902,649
Northeast	9,559,064	12,198,230	12,562,605	13,324,339	11,263,751	11,832,690	10,059,894
Southeast	5,258,519	5,260,134	3,917,567	3,004,202	2,589,297	2,005,536	1,957,720
South	7,101,560	8,743,780	6,548,683	3,622,136	4,420,924	5,084,944	4,765,327
Center-West	1,755,779	1,868,496	1,346,074	905,357	1,147,793	1,158,026	1,125,147
Brasil	24,992,579	29,464,275	26,117,614	23,465,649	23,124,782	24,322,133	21,810,737
<u>Quantity produced (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	5.3	4.7	6.7	11.1	16.0	17.4	17.9
Northeast	38.2	41.4	48.1	56.8	48.7	48.6	46.1
Southeast	21.0	17.9	15.0	12.8	11.2	8.2	9.0
South	28.4	29.7	25.1	15.4	19.1	20.9	21.8
Center-West	7.0	6.3	5.2	3.9	5.0	4.8	5.2

Source: IBGE

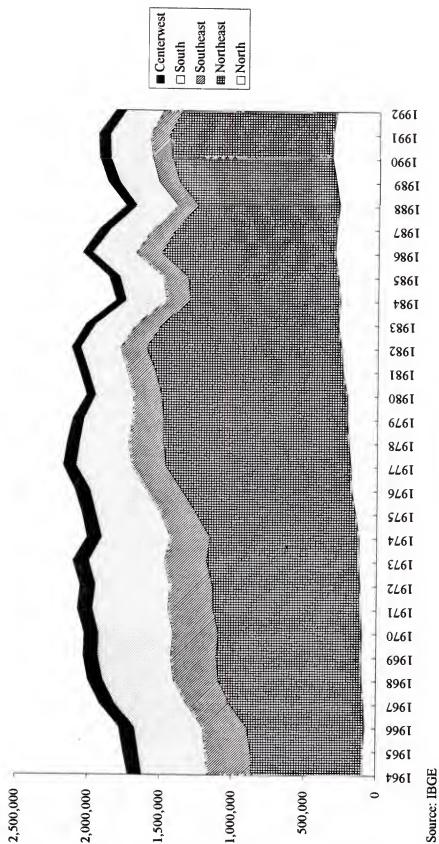


Figure 7.19  
Area Harvested (ha)  
Cassava

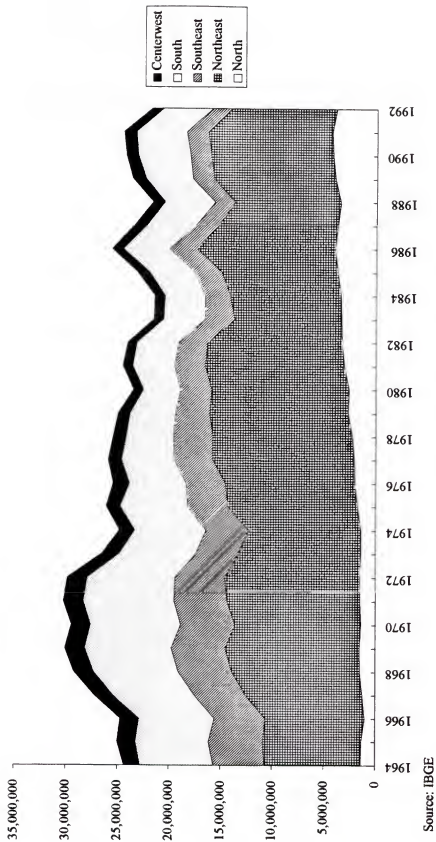


Figure 7.20  
Production: MT  
Cassava

Table 7.13  
Corn Production

<u>Area harvested (ha):</u>	1965	1970	1975	1980	1985	1990	1992
North	63,916	67,135	108,368	174,967	247,996	325,742	373,699
Northeast	1,748,608	1,700,515	2,497,651	2,193,108	2,592,074	2,139,037	2,569,103
Southeast	3,140,024	3,311,182	2,964,018	2,940,532	2,824,195	2,704,098	3,243,697
South	3,303,941	4,183,993	4,396,538	5,145,339	5,009,815	4,737,300	5,646,277
Center-West	514,829	595,283	888,112	997,351	1,124,269	1,488,130	1,556,177
Brazil	8,771,318	9,858,108	10,854,687	11,451,297	11,798,349	11,394,307	13,388,953
<u>Area harvested (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.7	0.7	1.0	1.5	2.1	2.9	2.8
Northeast	19.9	17.2	23.0	19.2	22.0	18.8	19.2
Southeast	35.8	33.6	27.3	25.7	23.9	23.7	24.2
South	37.7	42.4	40.5	44.9	42.5	41.6	42.2
Center-West	5.9	6.0	8.2	8.7	9.5	13.1	11.6
<u>Quantity produced (t):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	49,817	59,487	116,147	221,931	318,737	470,047	553,307
Northeast	1,416,698	870,829	1,614,457	830,460	1,537,573	648,582	1,141,191
Southeast	4,624,199	5,370,655	4,682,865	5,595,565	6,204,713	5,258,540	8,162,727
South	5,174,844	7,027,784	8,307,755	11,638,995	11,521,353	11,792,614	16,087,591
Center-West	846,363	887,254	1,613,292	2,085,121	2,435,804	3,177,991	4,611,818
Brazil	12,111,921	14,216,009	16,334,516	20,372,072	22,018,180	21,347,774	30,556,634
<u>Quantity produced (percent of national total):</u>							
	1965	1970	1975	1980	1985	1990	1992
North	0.4	0.4	0.7	1.1	1.4	2.2	1.8
Northeast	11.7	6.1	9.9	4.1	7.0	3.0	3.7
Southeast	38.2	37.8	28.7	27.5	28.2	24.6	26.7
South	42.7	49.4	50.9	57.1	52.3	55.2	52.6
Center-West	7.0	6.2	9.9	10.2	11.1	14.9	15.1

Source: IBGE



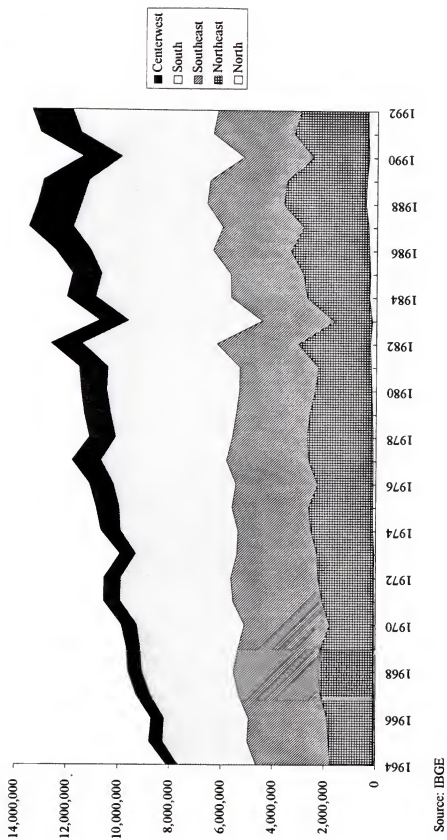


Figure 7.21  
Area Harvested  
Corn

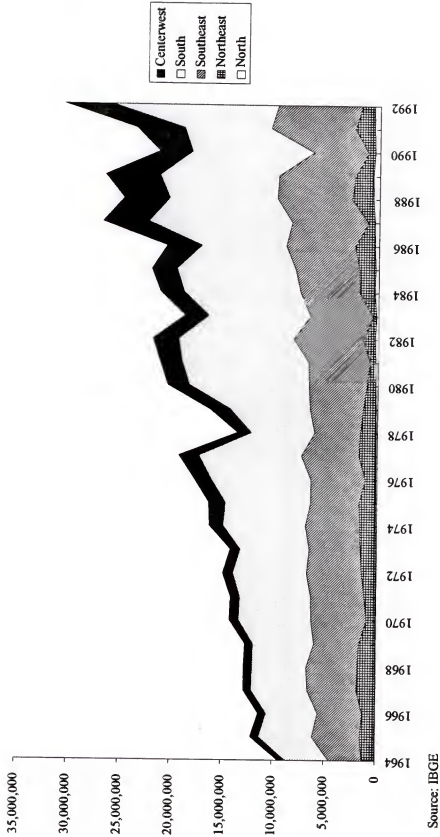


Figure 7.22  
Production: MT  
Corn

1980s. Corn as a percent of all area in crops rose from about 25% to 30% between 1961 and 1971 and since then has remained in the range of 20% to 27%. Production of corn has expanded slightly more than area. Production expanded through 1977, was interrupted by the bad harvests of 1978-79, and has since expanded less consistently. Peak production was achieved in the late 1980s and 1992.

The area in corn expanded most rapidly in the Center-West and even more so in the North, while expanding more slowly in the South and Northeast. Area in corn in the North more than quintupled between 1970 and 1990. Area in corn in the Center-West almost tripled between 1970 and 1992. The Northeast and South have essentially maintained their shares of area in corn production while the North has expanded from 6% to about 12%. The share of the Southeast has fallen commensurately. Production in the Center-West grew from less than 900,000 tons to 4.6 million tons in 1992. Production per hectare remains higher in the Southeast, the Center-West, and especially the South, than in the North and Northeast. The Northeast has seen a fall in relative productivity. In 1970, with 17% of land area, it produced 6% of Brazilian corn. In 1992, with 19% of land area, it produced less than 4%.

### Cattle

Cattle must be considered in any look at land-use patterns in Brazil, though statistics on livestock and pasture land are not reliable. Brazil's herd is among the largest in the world. Livestock accounts for 40% of agricultural GDP, but only 25% of agricultural labor (World Bank 1994). Pasture, planted and natural, account for most utilized farmland. Natural pasture has fallen from 67% of utilized farmland in 1960 to 50% in 1980. Planted pasture has risen from 12% of utilized farmland in 1960 to 26% in 1980. As of 1991, pasture accounted for 75% of utilized farmland, down slightly from 81% in the 1960s. Brazilian livestock production is generally extensive, though intensification is beginning to occur in the South and Southeast, with planted pastures, improved breeding, and use of feedlots. At the time of the 1985 census, the Center-West was the largest livestock producing area with 31% of the cattle

Table 7.14  
Cattle Production

Cattle ('000 head):

	1965	1970	1975	1980	1985	1990	1991
North	1,759	2,240	2,114	3,687	5,273	9,008	10,921
Northeast	18,022	20,379	18,297	21,876	23,015	26,190	26,669
Southeast	33,777	35,771	35,586	35,126	34,621	36,323	36,724
South	16,195	19,426	21,668	24,609	24,387	25,326	25,272
Center-West	20,752	20,048	24,866	33,673	41,126	50,255	52,550
Brasil	90,505	97,864	102,531	118,971	128,423	147,102	152,136

Cattle (percent of national total):

	1965	1970	1975	1980	1985	1990	1991
North	2	2	2	3	4	6	7
Northeast	20	21	18	18	18	18	18
Southeast	37	37	35	30	27	25	24
South	18	20	21	21	19	17	17
Center-West	23	20	24	28	32	34	35
Brasil	100	100	100	100	100	100	100

Source: IBGE



Figure 7.23  
Cattle  
('000 Head)

population; the Southeast had 27%. Although expansion of the cattle industry for export has been blamed for deforestation and displacement of small farmers, in fact, Brazil's cattle exports are a very small fraction of production (table 6.2). Cattle herds have expanded in all regions of the country, with the fastest rates of expansion in the frontier areas. The herd in Rondonia expanded thirtyfold between 1970 and 1988, and dominates the cleared areas (Hecht 1993). However, the lack of natural pasture in the North, among other factors, slows expansion. The developed regions of the South, Southeast, and Northeast still support the largest herds.

### Regional Patterns

Among the most important features of regional change in land use is the trend toward production of export and, to a lesser extent, import-substitute crops in the most productive and developed regions. Agricultural production for export is concentrated in those regions that are most industrialized. The value attributed to, or extracted from, these crops is clearly higher than that of domestic food crops. In part, this reflects a change in consumption habits (Barkin et al. 1991), but also reflects the higher value extracted from products that earn or save foreign exchange. The concentration of tradeable crops in the most productive areas has relegated domestic crops and small-scale producers to production in poor lands and frontier areas with important consequences in terms of soil degradation and deforestation.

Some of the most dramatic changes in crop patterns have occurred in the South. In the 1950s the South, and particularly Paraná, was affected by the coffee boom. The land area in coffee expanded from 7% to 19% of total area harvested (Graham et al. 1987); the area then contracted under the coffee eradication program of the 1960s. Soybean production began to expand in Rio Grande do Sul in the 1960s, leading the rapid threefold expansion of soybean crop area, from 11% to 37%, in the 1970s. As soybeans became the leading crop for the southern region, they displaced coffee in Paraná and food crops (corn, beans, and cassava) in Rio Grande do Sul, Santa Catarina, and Paraná. Wheat production

expanded rapidly in the 1980s. The South now accounts for the largest shares of production in the temperate crops: cotton, corn, rice, soybeans, and wheat.

The Southeast has been a key region for export crops since the establishment of coffee production. Over the last thirty years the region's agricultural land has been increasingly devoted to export and industrial crops, at the expense of domestic food crops. The levels of capital investment and mechanization are the highest in the country (IBGE), as are levels of productivity, even in traditional crops. Coffee production expanded in São Paulo in the 1950s, as did sugar production, while cotton fell by half. The area in coffee fell in the 1960s with the eradication program and, as cotton held steady, the land was put into domestic food crops, primarily corn.

Export and industrial crops expanded rapidly in the 1970s, replacing domestic food crops again in the Southeast. Sugar, under the Proalcool incentives and, to a much smaller degree, coffee<sup>19</sup> expanded in the 1970s. Oranges and soybeans largely replaced cotton. São Paulo, with little new land available for expansion showed the greatest increases in productivity and employment of technology (Grindle 1986). The Southeast now accounts for the largest shares of production of tropical exports--coffee, oranges, and sugarcane.

The Northeast was the first region devoted to export crops in Brazil, exporting sugarcane from the earliest days of the colony. However, it is now one of the least productive areas of the country with very traditional agricultural production, and has not enjoyed the benefits of capital investment felt in the Center-South. The region is now a large producer of domestic food crops, in comparison with successful exporting regions. It was the only region to see an increase in food crops in the 1970s and a fall in

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<sup>19</sup> Coffee production was shifted northward, mainly to Minas Gerais, following losses to frost in the more southern areas of production (Graham et al. 1987).

export crops.<sup>20</sup> The Northeast is the primary producer of cassava, and an important producer of sugarcane. It has lost its predominance in cotton.

The increase in export crop production, manifested in the shift of crop composition in the South and Southeast and accompanying production methods (Chapter 6), also has forced changes in land use in the frontier regions, first with an expansion of domestic crop production and, in the Center-West, a subsequent shift to export crops. The Center-West was the new agricultural frontier at the beginning of the period considered here, but has already seen an expansion of export crop production, mainly soybeans, displacing domestic food production as the frontier moved on. Coffee expanded into the region with the Paraná boom of the 1950s and then contracted. Soybeans expanded in the 1970s, especially in southern Mato Grosso, and food production fell sharply (Graham et al. 1987). Natural and planted pasture account for over 90% of utilized farmland. The Center-West produces important shares of corn and soybeans.

### Frontier Expansion

Traditionally the frontier in Brazil served as the main source of expansion of agricultural production, driven by expansion of commercial crops. This pattern has continued in the Center-West, where expansion of agriculture has contributed significantly to domestic and export crop production. The most recent expansion in the North, however, appears to be driven by changing agricultural structures in other regions (Ozorío de Almeida 1992) rather than the possibility of increasing national production substantially. There have been three agricultural frontiers over the last three decades--the Northeast, Center-West, and North--accounting for 85% of the total increase in agricultural land from

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<sup>20</sup> Graham et al. note, "While this may represent a logical current comparative advantage for the region, it does not bode well for the nation as a whole if the incentives and technological potential for the production of domestic foodstuffs is of such a nature as to relegate their production to the most traditional and low productivity regions in the country." (1987, p.14)



1960 to 1985 (IBGE, World Bank 1994). The frontier has expanded throughout this century from the South and Southeast, reaching Paraná in the 1940s and 1950s. In the early 1960s, expansion occurred in the Northeast, in Piauí, Maranhão, and western Bahia. Southern expansion reached Goiás and Mato Grosso do Sul in the 1960s and 1970s. By the 1970s, the Center-West was expelling more population than it was absorbing. Expansion reached Amazonia, notably Acre and Rondônia, in the 1970s and 1980s and, most recently, Roraima and Amazonas. From the Northeast, the frontier expanded to Maranhão, then to Pará, Goiás, and Tocantins, where it has met the southern influx (Ozorio de Almeida 1992). Agricultural frontier expansion slowed considerably in the 1980s. Between 1980 and 1985 total agricultural area expanded by only 6.5 million ha in the three regions, as compared with 42.2 million ha between 1975 and 1980. Much higher levels of occupation have been attained in the Center-West than on the more recent Northern frontier.<sup>21</sup>

In the 1960s, about one-third of rural migrants (about 14 million total) originated in the Northeast and another third in São Paulo and the South (IBGE, World Bank 1994). In the 1970s the largest migration, about one-third (about 17 million) came from the earlier frontier areas of Paraná and the Center-West. Two very different sets of factors drove migration: agricultural modernization in the Center-South, including recent frontier areas, and agricultural stagnation and land degradation in the Northeast and North. In both cases, however, it is the lack of opportunity elsewhere that appears to drive migrants to Amazonia, not the opportunity of Amazonia that attracts them.

Evidence of slowing migration in the 1980s includes the slowdown in agricultural land expansion in the North, from a 9.9 million ha increase 1975-80 to 2.3 million ha 1980-1985. The recession of the 1980s may have slowed migration as a rise in rural employment compensated for a fall in capital investments (Rezende 1991, Schneider 1992). A variety of other factors contributed to this

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<sup>21</sup> On trends in population see Ozorio de Almeida (1992), Wood and Carvalho (1988), and Bacha and Klein (1989).

slowdown, including the reduction in fiscal incentives for regional development, the increasing recognition of the unsustainable character of regional agriculture, difficulties of colonization schemes, and international focus on deforestation and Indian populations, which suggest that rapid expansion may not continue. However, recent reports on deforestation and burning suggest that rates are up again (Schemo 1995). Trade liberalization may renew pressure for frontier expansion as mechanized export crops expand again.

The process of agricultural modernization and mechanization, closely associated with the expansion of non-traditional export crops, has been reviewed in Chapter 6. Large populations either lost their land rights or opted to sell their farms as land prices rose.<sup>22</sup> While many of the newly landless either stayed on as temporary laborers or migrated to the cities, the populations that opted to move to the frontier have been large enough to effect substantial changes in land cover in the region.<sup>23</sup> The population of the North expanded from 3.6 million in 1970 to 10.2 million in 1991 (table 5.2); between 1970 and 1985 the number of rural properties in the region rose by 91% (Valadares 1991).

Frontier expansion has entailed extensive deforestation.<sup>24</sup> The causes of deforestation in the North, especially the expansion of pasture and the abandonment of agricultural lands, have been widely discussed in recent years. The entire debate cannot be reviewed here. In general it has focused on the reasons for emigration to the frontier and the causes of settlement failures and land abandonment. Some explanations have blamed government incentives that encouraged large, unprofitable ranching operations

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<sup>22</sup> Schneider (1992) directly links rising and falling relative land prices in the Center-South with increasing and decreasing migrant flows.

<sup>23</sup> The increase in the population in Amazonia in the 1970s accounts for only 5% of rural migration for the period (World Bank 1994).

<sup>24</sup> The extent of deforestation in the Amazon itself has been widely debated. Whatever the pace of deforestation, it is clear that the agricultural frontier has arrived in Amazonia.

(Binswanger 1989, Mahar 1989, Repetto and Gillis 1988)<sup>25</sup> and other large-scale projects; others have focused on the slash-and-burn methods of small farmers (Collins 1986, Dourojeannie 1991).<sup>26</sup> Many explanations have pointed to both large and small farmer techniques and operations as rational responses to circumstances of perverse government incentives, poor land-tenure security, and government provision of infrastructure, especially road-building (e.g., Hecht 1993, Schneider 1992, Collins 1986, Smith 1982). Others have pointed to the unsuitability of land in the region for agriculture, particularly its unsuitability for intensive use and modern technologies (Collins 1986) or, exactly the reverse, because of the need for high levels of inputs (Alves and Contini). To approach the problem from just one of these perspectives would ignore the evidence that a very wide range of factors contribute to the growth of frontier populations and to decisions about land use and abandonment.

The government facilitated and encouraged the expansion of the frontier<sup>27</sup> with a deliberate policy of using the region to absorb the poor populations of the Northeast.<sup>28</sup> The Transamazon highway, begun in 1970, was intended to promote settlement of the region. A series of highways crisscrossing the region has served to bring in settlers and supplies, and to promote marketing of local products. These

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<sup>25</sup> Government incentives included fiscal and legal provisions promoting frontier expansion (Binswanger 1989), affecting taxes on agricultural income, rules of land allocation, land taxes, capital gains and commodity taxes, regional and sectoral taxes, and provision of credit. Only these last two have been substantially changed, with a reduction in tax incentives and subsidized credit for rural development.

<sup>26</sup> Slash-and-burn technologies which may be appropriate for the region on a small scale are degradatory on a large scale. Small farmers have been alternately blamed for unsustainable land-use practices in the Amazon and promoted for developing the most efficient and ecologically sound land-use practices for the region (Collins 1986).

<sup>27</sup> Useful sources on government-supported and spontaneous colonization and on initiatives in road-building and colonization include Lisansky (1990), Smith (1982), Ozorio de Almeida (1992) among others; sources on government incentives to large-scale products include Mahar (1989), and Binswanger (1989).

<sup>28</sup> The government had other reasons for colonizing the Amazon, including protecting the country's borders and reducing pressure for land reform. Increasing agricultural production was not an important goal. However, with under- and unemployment over 22% in the Northeast in the late 1970s, the encouragement of colonization had an important role to play in government policy (Grindle 1986). Ozorio de Almeida (1992) estimates that the government spent over US \$ 7.5 billion in the 1970s, about 50% of which went for road-building, to support Amazon colonization.

include the Belém-Brasília, Cuiabá-Porto Velho, Cuiabá-Santarém, and Porto Velho-Manaus-Rio Branco highways, the abandoned Perimetral Norte Project, and numerous feeder roads. Expansion of colonization has closely followed the expansion of the road system (Schneider 1992, Smith 1982). Large-scale development projects in the region, such as Carajas and POLONOROESTE, likewise fostered an influx of population.

Evidence suggests that the largest land-use changes at the current frontier have probably taken place through the creation of pasture, often with an intermediary stage in annual crops, and the abandonment of degraded pasture lands. Estimates of deforestation give an idea of the extent of this land-use and land-cover change. Cattle populations also provide a picture of changing land cover. The expansion of cropland and cattle is closely related to other activities in the region, including urban growth, mining, and timber extraction.

The development of large-scale cattle ranches based on government financial incentives, primarily tax breaks, has been widely blamed for pasture expansion in the Amazon (Mahar 1989, Binswanger 1989, Repetto and Gillis 1988). This assignment of blame is convenient because it implies that a simple change in government policy would reverse the process of deforestation. Certainly ranches enjoying government incentives have accounted for a large percentage of both pasture land and cattle in the region.<sup>29</sup> However, small farmers are also eager to invest in cattle, even when financial returns appear poor (Schneider 1992, Hecht 1993, Browder 1985), given their value as a hedge against economic uncertainty. The highest rates of deforestation are currently in Rondônia, where colonists and smallholders are involved in livestock expansion.<sup>30</sup>

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<sup>29</sup> Hecht (1993) cites evidence that as much as 30% of forest clearing in the eastern Amazon was due to large ranching operations.

<sup>30</sup> The population of Rondônia doubled between 1980 and 1985, from 500,000 to 1 million; deforestation increased at a faster rate than population growth (Miranda and Mattos 1992).

Hecht (1993) has found that most cleared forests in Latin American lowlands are used as pasture. In Brazil, livestock and pasture-creation are a means of claiming lands, capturing financial benefits, and making speculative gains. The relation between cattle markets and increases in herds in the Amazon is weak (Mahar 1989, Browder, Hecht 1993), since current market value often is not the primary incentive for cattle raising. Pastures are usually abandoned within ten years, because of poor soils and the relative difficulty of managing pasture as opposed to opening new lands (Hecht 1993). Perhaps less than 50% of the land cleared in the Amazon is actually used (Browder).

This analysis has emphasized the factors pushing migrants to Amazonia. Directly, the demand for land for large-scale production of export crops and import substitutes, and the incentives given to modernization and mechanization, have displaced large numbers of the rural work force, who could not be entirely absorbed by growing urban areas (Chapter 6). The expansion of the frontier into Amazonia has been analyzed in terms of a capitalist, market penetration of the region (Ozorio de Almeida 1992, Foweraker 1981, Bunker 1985).<sup>31</sup> Certainly the expansion of the frontier has depended on the evolution of the Brazilian economy and the expansion of the agricultural market. Whether the populations moving into the region are part of the market system, or whether they are displaced to the Amazon because they are not succeeding within the markets of the more developed regions of the country, the fact remains that the changing structure of the agricultural sector and labor markets provides a substantial push toward the region.

A better understanding of frontier expansion in the North can be gained by looking at frontier expansion in the Center-West. In the Center-West a combination of push factors in developed areas, and the development of input technologies suitable for the soils of the region, meant that first the colonist frontier and then the modern agricultural frontier reached the region. As the same types of push factors

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<sup>31</sup> Bunker (1985), for example, discusses Amazon colonization in light of his view that expulsion of peasants from the developed regions of the country is an inherent part of capitalist expansion.

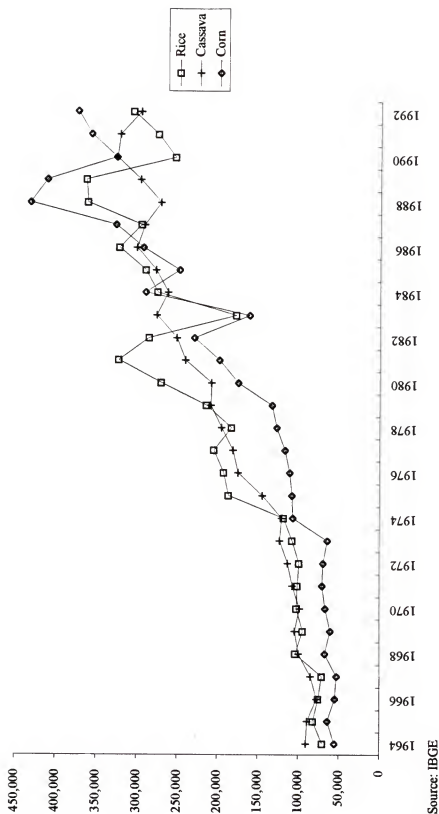


Figure 7.24  
North: Area Harvested (ha)  
Selected Domestic Crops

continued, the frontier was driven further north and west. As long as economic forces and government policies promote agricultural growth in Brazil, along with modernization and changes in the agricultural structure, the frontier can be expected to expand. However, the Center-West proved particularly adapted to production of export crops, especially soybeans, and to mechanization. The Amazon frontier has consistently encountered productivity problems. Moreover, it is clearly unsuited to the temperate crops which have been the keystone of export and import-substitute expansion.

Crop production in the North is a relatively poor indicator of overall land-use change for the region in that it explains only a small portion of deforestation. It does indicate clearly, however, the displacement of domestic food production from other regions and the importance of small farmers. The production of staple food crops (figure 7.24) on the frontier is the clear mark of small farmer settlement. The development of export and industrial crops marks a second phase in frontier development (Ozorio de Almeida 1992), which has occurred in the Center-West.<sup>32</sup> However, in the North, production of export and import-substitute crops remains minimal. Cassava, rice, and corn dominate crop production.

Arguments that frontier expansion is a direct consequence of capitalist and market growth (e.g. Foweraker 1981) hold that the process of resource extraction at the frontier today provides a surplus needed for urban accumulation. This may have been the case in the Center-West. However, at the Amazon frontier, the agricultural production share for domestic crops nationally is close to population share, and production of export crops is minimal. A significant surplus is not being created. Goodman argues, against Foweraker, that agriculture at the frontier is not an integral part of development elsewhere nor an important contributor to urban food supply. Because of the rise in consumption of import-substitutes and the modernization of the corn and now rice sectors, the agricultural production of the Amazon is an effect of labor displacement, not a response to domestic markets for foodstuffs. By

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<sup>32</sup> Goodman (1989) argues that most small farms consume what they produce.

contrast, the production of corn and particularly rice in the Center-West was well above population levels beginning in the 1960s, suggesting that in the Center-West played an integral part in providing food supplies to urban and exporting areas. Can it be expected that these regions will be incorporated into the modern, market-oriented agriculture patterns of the country as the Center-West has been, or will the region remain marginal to national agricultural production as degradation continues?

In sum, the frontier in Amazonia may be playing a very different role than earlier frontiers. While expansion of the frontier can be traced to foreign exchange pressures, migration to the Amazonian frontier and the consequent environmental changes, unlike earlier migrations, are providing little relief from economic pressures.<sup>33</sup> Rather, frontier expansion is an effect of the intensification and modernization of production in more productive regions, which are in turn a direct response to demand for export and import-substitute production.

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<sup>33</sup> It is worth noting that proposals for sustainable development of rainforest regions, such as extractive reserves, in no way suggest that these regions can generate a surplus.



## CHAPTER 8 CONCLUSION

The debate over the relationship between trade and environment not only should remain open but should be expanded. To date, the debate has been framed very narrowly and the issues presented in fairly simplistic terms. Trade plays a much more complex role in shaping resource use than has been acknowledged, and is itself the product of a complex political economy. Latin America's perceived comparative advantage in natural resources is once again being promoted as the most effective driver of economic growth. Yet with deforestation proceeding at an alarming rate, and rising global concern about resource loss and global warming, it merits reconsidering whether Latin America's reliance on resource-based exports is determined by the abundance of resources or other export-push factors, and reconsidering the role of the state in mediating international pressures and reversing trends toward resource degradation.

In the case of Brazil, the record of changes in land use shows a clear pattern of response to trade pressures, filtered through domestic policy responses to those pressures. While the link between trade and patterns of land use is complicated by the number of issues involved, some clear trends have emerged from the case study. Changes in international markets and in domestic policies have modified or redirected land use, but have not reduced the dependence on extraction of resources nor reduced the pressures which drive trade. Brazil, as a large, relatively industrialized economy, provides a test case for Latin America in examining the trade-land use connection. Given that Brazil has been unable to end its reliance on extraction of "cheap" natural resources as a means of purchasing foreign exchange or reducing foreign exchange requirements, it seems unreasonable to expect that the smaller and less developed countries of Latin America will be able to escape from this pattern of resource use. Under

open trade conditions, whether created by international market opportunities or domestic policies favoring exports, Brazil and most Latin American countries will increase the production of export crops, in response to the unmet demand for foreign exchange. Under closed trade conditions, whether created by poor international markets or domestic policies of self-sufficiency and import substitution, Brazilian resource exploitation has increased to serve industrial and urban needs. In the smaller countries of the region, the environmental effect of restricted trade is more likely to appear in the form of poverty-induced land degradation, as on the Brazilian frontier and the Northeast. In all cases, however, there appears little hope of a move away from increasing resource exploitation as long as the pressures underlying trade remain.

The realization that trade drivers, both under free trade and other conditions, are fundamental shapers of resource use must be introduced to the trade-environment debate. First, the focus of the debate on industrial pollution and, in a more restricted sense, timber markets, has ignored the much larger changes induced through agricultural markets. As shown in the case of Brazil, land-use changes on a scale of global import are induced both directly through changing export patterns and indirectly through import-substitution and frontier expansion. Second, the misconception that trade restrictions remove countries from international economic pressures by reducing the role of foreign demand for resources has often guided the environmentalist position. Yet, development efforts within and outside of the export-led growth model have relied intensively on extraction of "cheap" resources from the agricultural sector.

To trade or not to trade, the question which has formed the core of the debate, is not a useful starting point. The role of trade in both development and resource-use remains ambiguous, but is certainly neither irrelevant nor benign. The terms and conditions in which trade takes place are the product of a complex conjunction of international and domestic forces. For developing countries these terms have, more often than not, undervalued natural resources. However, the protectionist option has

not relieved resource pressure. The forces which drive trade under liberal economic policies are not eliminated by isolationist retreat. Rather those benefits touted by neoclassical economics, comparative advantage and competition, may be lost. Resources that are undervalued on international markets may have no market value domestically, and thus their use or degradation will be ignored.

The role of the state has been largely delegitimized by the recent neo-liberal wave. Not only trade policy liberalization but also exchange rate liberalization, privatizations, and deregulation in a wide range of sectors are part of the current policy prescription. State interventions are widely viewed as an impediment to growth and development. Certainly overgrown public sectors in many countries drained national resources and hampered economic growth by limiting competition and interfering in markets. Reducing government undoubtedly alleviates fiscal deficits and improves market functioning in many cases. However, efforts to blame all resource mismanagement on government policies, on the basis of a few recent case studies (Mahar 1989, Binswanger 1989, Repetto and Gillis 1988), neglect Latin America's long history of resource exploitation, a history which pre-dates this form of government intervention by many years.

Structuralist and neo-structuralist literature has explored the relationship between development and trade, and between international political-economic structures and trade pressures. Trade policy must be seen as a response to international conditions. In the post-War years, Latin American trade policies have largely aimed to create space for domestic development by reducing foreign-exchange demands and (re)constructing comparative advantage in more promising sectors. These theoretical discussions about Latin American development have pointed to the role of the state in capturing the value of exports for reinvestment in domestic sectors and for creation of linkages between the expanding sector and the rest of the economy. It should be borne in mind that the interventionist state is not solely the product of special interests and political maneuvering. Very real difficulties of development, including poorly functioning markets, problems of inequity, the nation's inability to capture the benefits

of resource exploitation, and trade imbalances led to efforts on the part of the state in developing countries to resolve these problems and promote development through intervention in markets. In part, these problems exist because developing countries are faced with an international structure which inherently favors the developed countries. The current curtailment of the role of the state will reveal that many of these problems which led to the expansion of state functions still exist.

Concern with land use, and other environmental impacts, has been largely incompatible with this development literature insofar as the literature has stressed means to achieve industrial development in adverse international conditions. In the case of Brazil, agriculture and the use of land resources have played a pivotal role in both development strategies and efforts to buffer the country from international and domestic pressures. The sector has provided foreign exchange for development directly through exports and indirectly through import-substitution. Land resources at the frontier have buffered the state from the social, political, and economic effects of agricultural modernization and development of a capital-intensive industrial sector.

If the resource-use decisions prompted by international markets are often prejudicial to sound resource use, and reliance on trade for development is an uncertain path, the state appears as the only force potentially capable of mediating between the market and society's use of resources. Ironically, the dismissal of the state from the development process has occurred just as sustainable development and concern about sound resource-use at a global level are also being adopted as part of the development agenda. Sustainable development inherently requires long-term management of resources which international markets are unlikely to produce.

The ability of states to affect development paths and resource-use patterns has become increasingly restricted over the last decade because of the move toward economic liberalization and the restructuring of the global political economy. Trade volumes, capital flows, and privatization are changing the structure and size of the international economy and national economies at a rapid rate.

With the increases in trade and foreign capital inflows, countries are increasingly vulnerable to changes in exchange rates, export markets, investment levels, international prices, and volatility in the international economy. The mandate of the national state to buffer these impacts has been greatly reduced.

The state should not be ignored as an important player in the development process. Environmental issues in particular point to the need for a continuing, but reoriented, state presence. From a neoclassical perspective, the prevalence of market failures involving the environment and the need for regulatory and legal frameworks to ensure smooth functioning of markets, requires government intervention. More important, from a structural perspective, the inherent imperative in the market to maximize resource use, the peculiarities of the law of comparative advantage, and the structure of terms of trade for developing countries and primary commodities require that the public sector act as a buffer against the international system and as a force for reconstructing comparative advantage. More political space must be given to the state to make development and resource-use choices outside of the market if either development (beyond economic growth) or sustainable use of resources is to be achieved.

While the Latin American state has rarely disposed itself toward resource conservation or even sound management practices, at least in the larger countries it does have some capacity to mediate the impacts of trade, as the experience of the 20th century has shown. The only possibility of reshaping Latin America's role in the international trading system in a direction which would promote sounder resource and land use patterns--considering both the national and international implications of resource use--may lie with the state.

The continuing role of international trade and economic forces in shaping Brazilian natural resource exploitation suggests that few if any Latin American countries will be able to substantially reshape their relationships with international markets in natural resources without substantial changes in the international structures that favor resource exploitation. The lesson that has not been learned--or

perhaps was learned in part and then dismissed with the abandonment of inward-looking policies--is the need to reduce dependence on resource exploitation. Resource and land use are once again openly subject to the direction of international trade drivers.

As the Latin American economies are now constructed they are condemned to resource degradation. The capital-intensive industrial style of development that the larger countries have emulated is in itself highly resource-intensive and polluting. Industrial and urban pollution increases may simply cancel out the gains of economic growth (Sunkel 1980). Certainly, as yet in Latin America, there is little evidence that rising incomes are relieving pressure on resources. Neither the larger, more industrialized countries nor the smaller countries have relieved the pressure on natural resources, pressure that both commodity exports and poverty create.

The fundamental question that must be addressed is not the relationship of trade to environment but the relationship of development as it is understood today to the environment. The apolitical, technical approach to resource-use questions arising from the current trade-environment debate fails to recognize that resource-use patterns are rooted in political-economic structures. Solutions will require political conditions allowing for change in trade patterns and styles of development that are causing environmental degradation. Under various economic regimes the centrality of resource exploitation has remained without development serving to relieve pressure on the resource base. This pressure is now of international concern. While valiant efforts are being made to introduce sustainable development on a micro-scale, about the only solution that has been proposed for international and macroeconomic pressures is isolation. It is time to give serious consideration to a model of development that not only does not rely on consistent undervaluation of natural resources but is functional at a national and international scale. Trade policy must take into account the large-scale and often irreversible changes in land use, as well as other resource exploitation, entailed in reshaping trade patterns and expanding

consumption. Rethinking development in a world of scarce resources and large human populations must center on a move away from ever-expanding resource use.

## REFERENCE LIST

- Abbott, Philip C. "Modelling Exchange Rate and Macroeconomic Linkages to Agriculture: Lessons from a Structuralist Approach." In Philip L. Paarlberg, and Robert G. Chambers, eds., Macroeconomics, Agriculture, and Exchange Rates. Boulder: Westview Press, 1988.
- Abbott, Philip C. and Stephen L. Haley. "International Trade Theory and Natural Resource Concepts." In John Sutton, ed., Agricultural Trade and Natural Resources: Discovering the Critical Linkages. Boulder: Lynne Rienner Publishers, 1988.
- Abel, Christopher and Colin Lewis, eds. Latin America, Economic Imperialism and the State: The Political Economy of the External Connection from Independence to the Present. London: Athlone Press, 1985.
- Abreu, Marcelo de Paiva and Winston Fritsch. "Brazil, Latin America and the Caribbean." In John Whalley, ed., Dealing with the North: Developing Countries and the Global Trading System. London, Canada: University of Western Ontario, 1987.
- Agarwal, Anil and Sumita Narain. Global Warming in an Unequal World: A Case of Environmental Colonialism. New Delhi: Center for Science and Environment, 1991.
- Alam, Asad and Sarath Rajapatirana. Trade Policy Reform in Latin America and the Caribbean in the 1980s. Working Paper 1104. Washington: World Bank, 1993.
- Albert, Bill. "External Forces and the Transformation of Peruvian Coastal Agriculture, 1880-1930." In Christopher Abel and Colin Lewis, eds., Latin America, Economic Imperialism and the State: The Political Economy of the External Connection from Independence to the Present. London: Athlone Press, 1985.
- Alexander, Robert. "Import-Substitution Industrialization." Reprinted in John Charles Chasteen and Joseph S. Tulchin, eds., Problems in Modern Latin American History: A Reader. Wilmington, DE: Scholarly Resources Books, 1994.
- Alves, Eliseu and Elisio Contini. "A Modernização da Agricultura Brasileira." In Antonio Salazar P. Brandão, ed., Os Principais Problemas da Agricultura Brasileira: Análise e Sugestões. Rio de Janeiro: IPEA/INPES, 1988.
- Andersen, Sigrid de Mendonça. "The South American Common Market: Effects on the Environment." Paper prepared for the Gaia Institute of Brazil, 1992.



- Anderson, Kym. "Agricultural Trade Liberalization and the Environment: A Global Perspective." World Economy 15, 1 (1992a): 153-172.
- Anderson, Kym. "Effects on the Environment and Welfare of Liberalizing World Trade: The Cases of Coal and Food." In Kym Anderson and Richard Blackhurst, eds., The Greening of World Trade Issues. Ann Arbor: University of Michigan, 1992b.
- Anderson, Kym and Richard Blackhurst, eds. The Greening of World Trade Issues. Ann Arbor: University of Michigan Press, 1992.
- Anderson, R.J., Luis F. Constantino, Nalin M. Kishor, Gaston J. Labadie and John Panzer. Structural Adjustment, Regional Development and Forest Degradation: Loggers and Migrants in Bolivia. LATEN Dissemination Note 11. Washington: World Bank, 1994.
- Antle, John M. and Richard E. Howitt. "Economic Analysis of Agricultural Resources in an Open Economy: A Hybrid Model." In John Sutton, ed., Agricultural Trade and Natural Resources: Discovering the Critical Linkages. Boulder: Lynne Rienner Publishers, 1988.
- Arden-Clark, Charles. "South-North Terms of Trade, Environmental Protection, and Sustainable Development." Gland, Switzerland: WWF-International, 1991.
- Arden-Clark, Charles. "International Trade, GATT, and the Environment." Gland, Switzerland: WWF-International, 1992.
- d'Arge, Ralph C. and Allen V. Kneese. "Environmental Quality and International Trade." International Organization 26, 2 (1972): 419-465.
- Arida, Persio, ed. Inflação Zero. Rio de Janeiro: Paz e Terra, 1986.
- Arrow, Kenneth, Bert Bolin, Robert Costanza, Partha Dasgupta, Carl Folke, C.S. Holling, Bengt-Owe Jansson, Simon Levin, Karl Goran Maler, Charles Perrings, David Pimentel. "Economic Growth, Carrying Capacity and the Environment." Science 268 (1995): 520-521.
- Audley, John. "Why Environmentalists Are Angry about the North American Free Trade Agreement." In Durwood Zaelke, Robert Housman, and Paul Orbuch, eds., Trade and the Environment: Law, Policy and Economics. Washington: Island Press, 1993.
- Bacha Edmar L. "Selected Issues in Post-1964 Brazilian Economic Growth." In Lance Taylor, Edmar L. Bacha, Eliana A. Cardoso, and Frank J. Lysy. Models of Growth and Distribution for Brazil. New York: Oxford University Press for the World Bank, 1980.
- Bacha, Edmar L. and Herbert Klein, eds. Social Change in Brazil, 1945-85: The Incomplete Transition. Albuquerque: University of New Mexico Press, 1989.
- Baer, Werner. The Brazilian Economy: Growth and Development. 3rd edition. New York: Praeger, 1989.

- Baer, Werner. The Brazilian Economy: Growth and Development. 4th edition. New York: Praeger, 1995.
- Baer, Werner and Malcolm Gillis, eds. Export Diversification and the New Protectionism: The Experiences of Latin America. Champaign: University of Illinois, Bureau of Economics and Business Research, 1981.
- Balassa, Bela, Gerardo M. Bueno, Pedro-Pablo Kuczynski, and Mario Henrique Simonsen. Toward Renewed Economic Growth in Latin America. Washington: Institute for International Economics, 1986.
- Baldwin, Robert E. "Are Economists' Traditional Trade Policy Views Still Valid?" Journal of Economic Literature 30 (1992): 804-829.
- Barbier, Edward and Michael Rauscher. "Trade, Tropical Deforestation and Policy Interventions." Environmental and Resource Economics 4 (1994): 75-90.
- Barkin, David, Rosemary L. Batt and Billie R. DeWalt. "The Substitution Among Grains in Latin America." In Michael J. Twomey and Ann Helwege, eds., Modernization and Stagnation: Latin American Agriculture into the 1990s. Westport: Greenwood Press, 1991.
- Barzelay, Michael and Scott Pearson. "The Efficiency of Producing Alcohol for Energy in Brazil." Economic Development and Cultural Change 31, 1 (1982): 131-144.
- Bates, Robert H. Markets and States in Tropical Africa: The Political Bias of Agricultural Policies. Berkeley: University of California Press, 1981.
- Batista, Jorge Chami. Debt and Adjustment Policies in Brazil. Boulder: Westview Press, 1993.
- Baumol, William J. and Wallace E. Oates. The Theory of Environmental Policy: Externalities, Public Outlays and the Quality of Life. Englewood Cliffs: Prentice Hall, 1975.
- Bautista, Romeo and Alberto Valdés. The Bias Against Agriculture: Trade and Macroeconomic Policies in Developing Countries. San Francisco: ICS Press, 1993.
- Bergsten, C. Fred. "Resources and Relations between the United States and Latin America." Reprinted in C. Fred Bergsten, Managing International Economic Interdependence: Selected Papers of C. Fred Bergsten 1975-1976. Lexington, MA: Lexington Books, 1977.
- Bernstam, M.A. The Wealth of Nations and the Environment. London: Institute of Economic Affairs, 1991.
- Bertram, Geoffrey and Rosemary Thorp. Peru, 1890-1977: Growth and Policy in an Open Economy. New York: Colombia University Press, 1978.
- Bethell, Leslie, ed. Colonial Spanish America. Cambridge: Cambridge University Press, 1987.
- Bhagwati, Jagdish. "The Case for Free Trade." Scientific American 269, 5 (1993a): 42-47.

- Bhagwati, Jagdish. "Trade and the Environment: The False Conflict?" Washington: American Enterprise Institute, 1993. Also in Durwood Zaelke, Robert Housman, and Paul Orbach, eds., Trade and the Environment: Law, Policy and Economics. Washington: Island Press, 1993b.
- Binswanger, Hans. "Brazilian Policies that Encourage Deforestation in the Amazon," World Bank Environment Department Working Paper 16. Washington: World Bank, 1989.
- Binswanger, Hans and M. Elgin. "Quais são as Perspectivas da Reforma Agrária?" Pesquisa e Planejamento Econômico 19, 1 (1989): 1-18.
- Birdsall, Nancy and David Wheeler. "Trade Policy and Industrial Pollution in Latin America: Where are the Pollution Havens?" In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Blaikie, Piers and Harold Brookfield. Land Degradation and Society. New York: Methuen, 1987.
- Bonelli, Regis and Pedro Malan. "The Brazilian Economy in the Seventies: Old and New Developments." World Development 5 (1977): 19-45.
- Bown, William. "Trade Deals a Blow to the Environment." New Scientist 128 (1990): 20-21.
- Braden, John B. and Stephen B. Lovejoy, eds. Agriculture and Water Quality: International Perspectives. Boulder: Lynne Rienner Publishers, 1990.
- Brandão, Antonio Salazar P., ed. Os Principais Problemas da Agricultura Brasileira: Análise e Sugestões. Rio de Janeiro: IPEA/INPES, 1988.
- Brandão, Antonio Salazar P. and José Carvalho. "Brazil." In Anne Krueger, Maurice Schiff, and Alberto Valdés, eds., The Political Economy of Agricultural Pricing Policy: Latin America. Baltimore: Johns Hopkins University Press for the World Bank, 1991a.
- Brandão, Antonio Salazar P. and José L. Carvalho. Trade, Exchange Rate and Agricultural Pricing Policies in Brazil. Washington: World Bank, 1991b.
- Bresser Pereira, Luiz. Development and Crisis in Brazil, 1930-1983. Boulder: Westview Press, 1984.
- Bresser Pereira, Luiz and Yoshiaki Nakano. Inflação e Recessão. São Paulo: Editora Brasiliense, 1984.
- Brooke, James. "Rubber Trees Grow Again in Brazil." New York Times July 9, 1995.
- Browder, J.O. Subsidies, Deforestation and the Forest Sector in the Brazilian Amazon. Washington: World Resources Institute, 1985.
- Brown, Katrina and David Pearce, eds. The Causes of Tropical Deforestation: The Economic and Statistical Analysis of Factors Giving Rise to the Loss of Tropical Forests. Vancouver: University of British Columbia Press, 1994.

- Brown Weiss, Edith. "Environment and Trade as Partners in Sustainable Development." American Journal of International Law 80 (1992): 700-35.
- Bulmer-Thomas, Victor. "The Latin American Economies in the 1930s." In The Cambridge History of Latin America. New York: Cambridge University Press, 1994.
- Bulmer-Thomas, Victor. The Economic History of Latin America since Independence. New York: Cambridge University Press, 1994.
- Bunker, Stephen G. Underdeveloping the Amazon: Extraction, Unequal Exchange and the Failure of the Modern State. Champaign: University of Illinois Press, 1985.
- Calegar, Geraldo M. and G. Edward Schuh. The Brazilian Wheat Policy: Its Costs, Benefits, and Effects on Food Consumption. Research Report 66. Washington: International Food Policy Research Institute, 1988.
- Capistrano, Ana Doris. Macroeconomic Influences on Tropical Forest Depletion: A Cross-Country Analysis, 1967-1985. Ph.D. Dissertation, Department of Food and Resource Economics, University of Florida, 1990.
- Capistrano, Ana Doris. "Tropical Forest Depletion and the Changing Macroeconomy 1967-85." In Katrina Brown and David Pearce, eds. The Causes of Tropical Deforestation: The Economic and Statistical Analysis of Factors Giving Rise to the Loss of Tropical Forests. Vancouver: University of British Columbia Press, 1994.
- Cardoso, Eliana and Albert Fishlow. "Latin American Economic Development: 1950-80." Journal of Latin American Studies 24 (Supplement 1992): 197-218.
- Cardoso, Eliana and Ann Helwege. "Populism, Profligacy, and Redistribution." In Rudiger Dornbusch and Sebastian Edwards, eds., The Macroeconomics of Populism in Latin America. Chicago: University of Chicago Press, 1991.
- Cardoso, Fernando Henrique. "Development and Environment: The Brazilian Case." CEPAL Review 12 (1980): 111-127.
- Cardoso, Fernando Henrique and Enzo Faletto. Dependency and Development in Latin America. Berkeley: University of California Press, 1979.
- Carvalho, José L. and Cláudio Haddad. "Foreign Trade Strategies and Employment in Brazil." In Anne Krueger, ed., Trade and Employment in Developing Countries. University of Chicago Press, 1981. Also Estratégias Comerciais de Mão-de-Obra no Brasil. Rio de Janeiro: Fundação Getúlio Vargas, 1980.
- Castro, Antonio Barros de and Francisco Eduardo Pires de Souza. A Economia Brasileira em Marcha Forçada. Rio de Janeiro: Paz e Terra, 1985.
- Cavallo, Domingo. "Agriculture and Economic Growth: The Experience of Argentina, 1913-1984." In Allen Maunders and Alberto Valdés, eds., Agriculture and Governments in an Interdependent

- World. Twentieth International Conference of Agricultural Economists. Brookfield, VT: Gower Publishing Co., 1990.
- Chenery, H.B and A.M. Strout. "Foreign Assistance and Economic Development." American Economic Review 54, 4 (1966): 679-733.
- Clark, E.H., J.A. Haverkamp and W. Chapman. Eroding Soils, the Off-Farm Impacts. Washington: The Conservation Foundation, 1985.
- Clements, Benedict J. Foreign Trade Strategies, Employment, and Income Distribution in Brazil. New York: Praeger, 1988.
- Cline, William, ed. Trade Policy in the 1980s. Washington: Institute for International Economics, 1983.
- Coes, Donald. "Brazil." In Demetris Papageorgiou, Michael Michaely and Armeane Choksi. Liberalizing Foreign Trade vol 4. Oxford: Basil Blackwell, 1991.
- Colchester, Macus and Larry Lohmann, eds. The Struggle for Land and the Fate of the Forests. London: Zed Books, 1993.
- Collins, Jane L. "Smallholder Settlement of Tropical South America: The Social Causes of Ecological Destruction." Human Organization 45, 1 (1986): 1-10.
- Copeland, Brian R. and M. Scott Taylor. "North-South Trade and the Environment." Quarterly Journal of Economics 109, 3 (1994): 755-87.
- Corden, W. Max. Trade Policy and Economic Welfare. Oxford: Clarendon Press, 1974.
- Corden, W. Max. "The Normative Theory of International Trade." In Ronald W. Jones and Peter B. Kenen, eds., Handbook of International Economics. New York: North-Holland, 1984.
- Cortés Conde, Roberto. "Export-Led Growth in Latin America: 1870-1930." Journal of Latin American Studies 24 (Supplement 1992): 163-179.
- Cortés Conde, Roberto and Shane Hunt, eds. The Latin American Economies: Growth and the Export Sector 1880-1930. New York: Holmes and Meier, 1985.
- Costanza, Robert. "Modelling Complex Ecological Economic Systems." BioScience 43, 8 (1993): 545-556.
- Crosby, Alfred. The Colombian Exchange: Biological and Cultural Consequences of 1492. Westport: Greenwood Press, 1972.
- Crosby, Alfred. Ecological Imperialism: The Biological Expansion of Europe 900-1900. Cambridge: Cambridge University Press, 1986.
- Cruz, Wilfredo and Robert Repetto. The Environmental Effects of Stabilization and Structural Adjustment Programs: The Philippines Case. Washington: WRI, 1992.

- Dahlberg, Kenneth A. and John W. Bennet, eds. Natural Resources and People: Conceptual Issues in Interdisciplinary Research. Boulder: Westview Press, 1986.
- Dale, Virginia H., Scott M. Pearson, Holly L. Offerman, Robert V. O'Neill. "Relating Patterns of Land-Use Change to Faunal Biodiversity in the Central Amazon." Conservation Biology 8, 4 (1994): 1027-1036.
- Daly, Herman. "From Adjustment to Sustainable Development: The Obstacle of Free Trade." In Ralph Nader, ed., The Case Against Free Trade: GATT, NAFTA, and the Globalization of Corporate Power. San Francisco: Earth Island Press, 1993a.
- Daly, Herman. "The Perils of Free Trade." Scientific American 269, 5 (1993b): 50-55.
- Daly, Herman. "Problems with Free Trade: Neoclassical and Steady-State Perspectives." In Durwood Zaelke, Robert Housman, and Paul Orbuch, eds., Trade and the Environment: Law, Policy and Economics. Washington: Island Press, 1993c.
- Daly, Herman and Robert Goodland. "Ecological-economic Assessment of Deregulation of International Commerce Under GATT." Ecological Economics 9 (1994): 73-92.
- da Mata, Milton. "Crédito rural: Caracterizacao do sistema e estimativas dos subsidies implicitos." Revista brasileira de economia 36, 3 (1982): 215-246.
- Dasgupta, Partha, Robert Eastwood, and Geoffrey Heal. "Resource Management in a Trading Economy." Quarterly Journal of Economics 92 (1978): 297-306.
- Dean, Judith. "Trade and the Environment: A Survey of the Literature." In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Dean, Judith, Seema Desai, and James Riedel. Trade Policy Reform in Developing Countries since 1985: A Review of the Evidence. World Bank Discussion Paper 267. Washington: World Bank, 1994.
- Dean, Warren. "Deforestation in Southern Brazil." In Richard P. Tucker and John F. Richards, eds., Global Deforestation and the Nineteenth Century World Economy. Durham: Duke University Press, 1983.
- Dean, Warren. Brazil and the Struggle for Rubber: A Study in Environmental History. Cambridge: Cambridge University Press, 1987.
- Diaz-Alejandro, Carlos. "Latin America in the 1930s." In Rosemary Thorp, ed., Latin American Debt in the 1930s: The Role of the Periphery in World Crisis. Cambridge: Cambridge University Press, 1984.
- Dinsmoor, James. Brazil: Responses to the Debt Crisis. Washington: IDB, 1990.
- Donnelly, John Thomas. External Debt and Economic Development in Postwar Brazil: 1947-1966. Ph.D. Dissertation, Department of Economics, Vanderbilt University, 1970.

- Dornbusch, Rudiger. "The Case for Trade Liberalization in Developing Countries." Journal of Economic Perspectives 6, 1 (1992): 69-85.
- Dornbusch, Rudiger and Sebastian Edwards, eds. The Macroeconomics of Populism in Latin America. Chicago: University of Chicago Press, 1991.
- Dorner, Peter. Latin American Land Reforms in Theory and Practice: A Retrospective Analysis. Madison: University of Wisconsin Press, 1992.
- Dourojeanni, Marc. "Commentary." In Joseph S. Tulchin, ed. Economic Development and Environmental Protection in Latin America. Boulder: Lynne Rienner Publishers, 1991.
- Duncan, Kenneth and Ian Rutledge, eds. Land and Labour in Latin America: Essays on the Development of Agrarian Capitalism in the 19th and 20th Centuries. Cambridge: Cambridge University Press, 1977.
- Ekins, Paul, Carl Folke, and Robert Costanza. "Trade, Environment and Development: The Issues in Perspective." Ecological Economics 9 (1994): 1-12.
- Emmanuel, A. Unequal Exchange. New York: Monthly Review Press, 1972.
- Esty, Daniel C. "GATTing the Greens: Not Just Greening the GATT." Foreign Affairs 72, 5 (1993): 32-36.
- Esty, Daniel C. Greening the GATT: Trade, Environment and the Future. Washington: IIE, 1994.
- Ethier, Wilfred J. "Higher Dimensional Issues in Trade Theory." In Ronald W. Jones and Peter B. Kenen, eds., Handbook of International Economics. New York: North-Holland, 1984.
- Food and Agriculture Organization (FAO). Production Yearbook. Rome: FAO, various years.
- Food and Agriculture Organization (FAO). Trade Yearbook. Rome: FAO, various years.
- Food and Agriculture Organization (FAO). Agrostat. (Software). Rome: FAO, 1993.
- Farah, Jumanah. Pesticide Policies in Developing Countries: Do They Encourage Excessive Use? World Bank Discussion Paper 238. Washington: World Bank, 1994.
- Fearnside, Philip M. "Deforestation in Brazilian Amazonia: The Effects of Population and Land Tenure." Ambio 22 (1993): 537-545.
- Figueroa, Adolfo. "Effects of Changes in Consumption and Trade Patterns on Agricultural Development in Latin America." In Werner Baer and Malcolm Gillis, eds. Export Diversification and the New Protectionism: The Experiences of Latin America. Champaign: University of Illinois, Bureau of Economics and Business Research, 1981.

- Findlay, Ronald. "The Fundamental Determinants of the Terms of Trade." In S. Grassman and E. Lundberg, eds., The World Economic Order: Past and Prospects. London: St. Martin's Press, 1980.
- Findlay, Ronald. "Growth and Development in Trade Models." In Ronald W. Jones and Peter B. Kenen, eds., Handbook of International Economics. New York: North-Holland, 1984.
- Fishlow, Albert. "Lessons of the 1890s for the 1980s." In Guillermo Calvo, Ronald Findlay, Pentti Kouri, and Jorge Braga de Macedo, eds., Debt, Stabilization and Development: Essays in Memory of Carlos Diaz-Alejandro. Oxford: Basil Blackwell, 1989.
- Fishlow, Albert, Carlos Diaz-Alejandro, Richard Fagen, and Roger Hansen. Rich and Poor Nations in the World Economy. New York: McGraw-Hill, 1978.
- Foweraker, Joe. The Struggle for Land: A Political Economy of the Frontier in Brazil from 1930 to the Present. Cambridge: Cambridge University Press, 1981.
- Frank, André Gunder. Capitalism and Underdevelopment in Latin America. New York: Monthly Review Press, 1969.
- French, Hilary. Costly Tradeoffs: Reconciling Trade and the Environment. Worldwatch Paper 113. Washington: Worldwatch Institute, 1993.
- Fritsch, Winston. External Constraints on Economic Policy in Brazil, 1889-1930. Pittsburgh: University of Pittsburgh Press, 1988.
- Furtado, Celso. The Economic Growth of Brazil: A Survey from Colonial to Modern Times. Berkeley: University of California Press, 1971.
- Furtado, Celso. Economic Development of Latin America. 2d ed. Cambridge: Cambridge University Press, 1976.
- Gallagher, J. and R. Robinson. "The Imperialism of Free Trade," Economic History Review Second Series 6 (1953): 1-15.
- Gallopín, G.C. "Human Dimensions of Global Change: Linking the Global and the Local Processes." International Social Science Journal 43, 4 (1991): 707-718.
- García, Jorge García. "The Impact of Trade and Macroeconomic Policies on the Performance of Agriculture in Latin America." In Allen Maunders and Alberto Valdés, eds., Agriculture and Governments in an Interdependent World. Brookfield: Gower, 1990.
- George, Susan. The Debt Boomerang: How the Third World Debt Harms Us All. Boulder: Westview, 1992.
- Glasser, Bernhard, ed. The Green Revolution Revisited. London: Allen and Unwin, 1987.



- Gligo, Nicolo. "Environment and Natural Resources in Latin American Development." In Osvaldo Sunkel, ed., Development from Within: Toward a Neostructuralist Approach for Latin America. Boulder: Lynne Rienner, 1993.
- Goldin, Ian and Odin Knudsen, eds. Agricultural Trade Liberalization: Implications for Developing Countries. Paris: OECD and World Bank, 1990.
- Goldin, Ian and Gervásio Castro Rezende. Agriculture and Economic Crisis: Lessons from Brazil. Paris: OECD Development Center, 1990.
- Gomes, C. and A. Perez. "The Process of Modernization in Latin American Agriculture." CEPAL Review 8 (1979): 55-74.
- Goodman, David. "Rural Economy and Society." In Edmar Bacha and Herbert Klein, eds., Social Change in Brazil, 1945-85: The Incomplete Transition. Albuquerque: University of New Mexico Press, 1989.
- Goodman, David and Michael Redclift. "The 'Bóias Frias': Rural Proletarianization and Urban Marginality in Brazil." International Journal of Urban and Regional Research 1, 2 (1977): 348-64.
- Gootenberg, Paul. Between Silver and Guano: Commercial Policy and the State in Post-independence Peru. Princeton: Princeton University Press, 1989.
- Graham, Douglas, Howard Gauthier, and Jose Roberto Mendonza de Barros. "Thirty Years of Agricultural Growth in Brazil: Crop Performance, Regional Profile, and Recent Policy Review." Economic Development and Cultural Change 36, 1 (1987): 1-34.
- Graham, Lawrence S. and Robert H. Wilson, eds. The Political Economy of Brazil: Public Policies in an Era of Transition. Austin: University of Texas Press, 1990.
- Grilli, Enzo R. and Maw Cheng Yang. "Primary Commodity Prices, Manufactured Goods Prices, and the Terms of Trade of Developing Countries: What the Long Run Shows." The World Bank Economic Review 8, 1 (1988): 1-47.
- Grindle, Merilee S. State and Countryside: Development Policy and Agrarian Politics in Latin America. Baltimore: The Johns Hopkins University Press, 1986.
- Grossman, Gene and Elhanan Helpman. Innovation and Growth in the Global Economy. Cambridge: MIT Press, 1991.
- Grossman, Gene and Alan Krueger. Environmental Impacts of North American Free Trade Agreement. Discussion Paper 158. Princeton: Woodrow Wilson School, Princeton University, 1992.
- Grunwald, Joseph and Philip Musgrove. Natural Resources in Latin American Development. Baltimore: Johns Hopkins Press for Resources for the Future, 1970.
- Haggard, Stephan and Robert R. Kaufman. The Politics of Economic Adjustment: International Constraints, Distributive Conflicts, and the State. Princeton: Princeton University Press, 1992.

- Haggard, Stephen and Robert Kaufman. "Economic Adjustment in New Democracies." In Joan M. Nelson, ed., Fragile Coalitions: The Politics of Economic Adjustment. New Brunswick: Transaction Books, 1989.
- Hall, Lana L. "United States Food Aid and the Agricultural Development of Brazil and Colombia, 1954-73." In John C. Super and Thomas C. Wright. Food, Politics, and Society in Latin America. Lincoln: University of Nebraska Press, 1985.
- Hecht, Susana B. "The Logic of Livestock and Deforestation in Amazonia." BioScience 43, 10 (1993): 687-695.
- Hecht, Susana B., R.B. Norgaard, and G. Possio. "The Economics of Cattle Ranching in Eastern Amazonia." Interciencia 13, 5 (1988): 233-240.
- Helpman, Elhanan and Paul R. Krugman. Trade Policy and Market Structure. Cambridge: MIT Press, 1989.
- Helpman, Elhanan and Assaf Razin, eds. International Trade and Trade Policy. Cambridge: MIT Press, 1991.
- Helwege, Ann. "Latin American Agricultural Performance in the Debt Crisis: Salvation or Stagnation?" Latin American Perspectives 17, 4 (1990): 57-75.
- Hettige, Hemamala, Robert E.B. Lucas, and David Wheeler. "The Toxic Intensity of Industrial Production: Global Patterns, Trends, and Trade Policy." American Economic Review 82, 2 (1992): 478-482.
- Hirschman, Albert O. "The Political Economy of Import-Substituting Industrialization in Latin America." The Quarterly Journal of Economics 82, 1 (1968): 1-32.
- Hirschman, Albert O. Essays in Trespassing: Economics to Politics and Beyond. New York: Cambridge University Press, 1981.
- Hirschman, Albert O. "A Dissenter's Confession: The Strategy of Economic Development Revisited." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Hirschman, Albert O. "Ideologies of Economic Development." Reprinted in John Charles Chasteen and Joseph S. Tulchin, eds., Problems in Modern Latin American History: A Reader. Wilmington: Scholarly Resources Books, 1994.
- Hockman, Bernard M. Trade Laws and Institutions: Good Practices and the World Trade Organization. World Bank Discussion Paper 282. Washington: World Bank, 1995.
- Hojman, David E., ed. Neo-Liberal Agriculture in Rural Chile. London: MacMillan, 1990.

- Homem de Melo, Fernando. "Export Agriculture and the Problem of Food Production." Brazilian Economic Studies 7 (1983): 1-19.
- Homem de Melo, Fernando. Export-Oriented Agricultural Growth: The Case of Brazil. World Employment Programme Research Working Paper WEP10-6/WF87. Geneva: ILO, 1987a.
- Homem de Melo, Fernando. "The External Crisis, Adjustment Policies and Agricultural Development in Brazil." CEPAL Review 33 (1987b): 83-90.
- Houghton, R.A. "The Worldwide Extent of Land-use Change." BioScience 44, 5 (1994): 305-313.
- Houghton, R.A., D.S. Lefkowitz, and D.L. Skole. "Changes in the Landscape of Latin America between 1850 and 1980: I. Progressive Loss of Forests." Forest Ecology Management 38 (1991): 143-172.
- Houghton, R.A., D.L. Skole, and D.S. Lefkowitz. "Changes in the Landscape of Latin America between 1850 and 1980: II. Net Release of CO<sub>2</sub> to the Atmosphere." Forest Ecology Management 38 (1991): 173-199.
- Hunt, Shane. "Growth and Guano in Nineteenth-Century Peru." In Roberto Cortés Conde and Shane Hunt, eds., The Latin American Economies: Growth and the Export Sector 1880-1930. New York: Holmes and Meier, 1985.
- Hurrell, Andrew and Benedict Kingsbury, eds. The International Politics of the Environment. Oxford: Clarendon, 1992.
- Instituto Brasileiro do Geografia e Estatística (IBGE). Anuário Estatístico do Brasil. Rio de Janeiro: IBGE, various years.
- Instituto Brasileiro do Geografia e Estatística (IBGE). Censo Agropecuário. Rio de Janeiro: IBGE, various years.
- Instituto Brasileiro do Geografia e Estatística (IBGE). Geografia do Brasil. Rio de Janeiro: IBGE, 1990.
- Inter-American Development Bank (IDB). Economic and Social Progress in Latin America. Washington: Johns Hopkins University Press for IDB, various years.
- International Monetary Fund (IMF). International Financial Statistics. Washington: IMF, various years.
- Jones, Ronald W. and Peter B. Kenen, eds. Handbook of International Economics. New York: North-Holland, 1984.
- Kahn, James and Judith McDonald. "Third World Debt and Tropical Deforestation." Ecological Economics 12 (1995): 107-123.

- Kemp, Murray C. and Ngo Van Long. "The Role of Natural Resources in Trade Models." In Ronald W. Jones and Peter B. Kenen, eds., Handbook of International Economics. New York: North-Holland, 1984.
- Kerr, Richard A. "It's Official: First Glimmer of Greenhouse Warming Seen." Science 270, 5242 (1995): 1565-1566.
- Koo, Anthony. Environmental Repercussions on Trade and Investment. East Lansing, Michigan State University, 1979.
- Knight, Peter T. Brazilian Agricultural Technology and Trade: A Study of Five Commodities. New York: Praeger Publishers, 1971.
- Knox, P.L. and J.A. Agnew. The Geography of the World Economy. London: Edward Arnold, 1989.
- Krueger, Anne O. "Trade Policies in Developing Countries." In Ronald W. Jones and Peter B. Kenen, eds., Handbook of International Economics. New York: North-Holland, 1984.
- Krueger, Anne O. The Political Economy of Agricultural Pricing Policy: A Synthesis of the Political Economy of Developing Countries, vol. 5. Baltimore: Johns Hopkins University Press for the World Bank, 1992.
- Krueger, Anne O., Maurice Schiff, and Alberto Valdés, eds. The Political Economy of Agricultural Pricing Policy: Latin America, vol. 1. Baltimore: Johns Hopkins University Press for the World Bank, 1991.
- Krugman, Paul R. "Trade, Accumulation and Uneven Development." Journal of Development Economics 8 (1982): 149-161.
- Krugman, Paul. "New Trade Theory and the Less Developed Countries." In Guillermo Calvo, Ronald Findlay, Pentti Kouri, and Jorge Braga de Macedo, eds., Debt, Stabilization and Development: Essays in Memory of Carlos Diaz-Alejandro. Cambridge: Basil Blackwell, 1989.
- Krugman, Paul R. Rethinking International Trade. Cambridge: MIT Press, 1990.
- Krugman, Paul. Geography and Trade. Cambridge: MIT Press, 1991.
- Krugman, Paul R. and Maurice Obstfeld. International Economics: Theory and Policy. 2d edition. New York: HarperCollins, 1991.
- Krugman, Paul R. and Anthony Venables. Globalization and the Inequality of Nations. NBER Working Paper 5098. Cambridge: NBER, 1995.
- Lal, Deepak. The Poverty of Development Economics. Cambridge: Harvard University Press, 1985.
- Lal, Deepak and Sylvia Maxfield. "The Political Economy of Stabilization in Brazil." In Robert Bates and Anne Krueger, Political and Economic Interactions in Economic Policy Reform: Evidence from Eight Countries. Cambridge: Blackwell, 1993.

- Lal, Deepak and Sarath Rajapatirana. "Foreign Trade Regimes and Economic Growth in Developing Countries." World Bank Research Observer 2, 2 (1987): 189-216.
- Lanly, Jean-Paul Karn, Deo Singh, and Klaus Janz. "FAO's 1990 Reassessment of Tropical Forest Cover." Nature and Resources 27, 2 (1991): 21-26.
- Larson, Brooke. Colonialism and Agrarian Transformation in Bolivia: Cochabamba, 1550-1900. Princeton: Princeton University Press, 1988.
- Latin American Center. Statistical Abstract of Latin America. Los Angeles: University of California, Latin American Center, various years.
- Leff, Nathaniel H. and Antonio Delfim Netto. "Import Substitution, Foreign Investment, and International Disequilibrium in Brazil." In Jorge I. Domínguez, ed., Essays on Mexico, Central and South America: Scholarly Debates from the 1950s to 1990s: Economic Strategies and Policies in Latin America, New York: Garland Publishing, 1994. Reprinted from Journal of Development Studies 2 (1966): 218-33.
- Leonard, H. Jeffrey, ed. Divesting Nature's Capital: The Political Economy of Environmental Abuse in the Third World. New York: Holmes and Meier, 1985.
- Leonard, H. Jeffrey. Pollution and the Struggle for the World Product: Multinational Corporations, Environment, and International Comparative Advantage. New York: Cambridge University Press, 1988.
- Leonard, H. Jeffrey, ed. Environment and the Poor: Development Strategies for a Common Agenda. New Brunswick: Transaction Books, 1989.
- Lele, Uma. Structural Adjustment and Agriculture: A Comparative Perspective on Performance in Africa, Asia, and Latin America. International Working Paper Series 92-30. Gainesville: Food and Resource Economics Department, 1992.
- Levin, Jonathan V. The Export Economies: Their Pattern of Development in Historical Perspective. Cambridge: Harvard University Press, 1960.
- Lewis, Arthur. "Development Economics in the 1950s." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Lisansky, J. Migrants to Amazonia: Spontaneous Colonization in the Brazilian Frontier. Boulder: Westview, 1990.
- Long, Millard. "External Debt and the Trade Imperative in Latin America." In Werner Baer and Malcolm Gillis, eds., Export Diversification and the New Protectionism: The Experiences of Latin America. Champaign: University of Illinois, Bureau of Economics and Business Research, 1981.
- Lopes, Francisco L. O Choque Heterodoxo: Combate a Inflação e Reforma Monetária. Rio de Janeiro: Editora Campus, 1986.

- Lopes, Mauro de Rezende. "The Mobilization of Resources from Agriculture: A Policy Analysis from Brazil." Ph.D. Thesis, Purdue University, 1977.
- Lopes, Mauro de Rezende. "Reformas agrícolas: os custos dos ajustes parciais." Conjuntura Econômica July 7, 1994: 25-29
- Lopez, Ramon. "The Environment as a Factor of Production: The Economic Growth and Trade Policy Linkages." In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Love, Joseph and Nils Jacobsen, eds. Guiding the Invisible Hand: Economic Liberalism and the State in Latin American History. New York: Praeger, 1988.
- Low, Patrick, ed. International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Low, Patrick and Raed Safadi. "Trade Policy and Pollution." In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Low, Patrick and Alexander Yeats. "Do 'Dirty' Industries Migrate?" In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Lucas, Robert E.B., David Wheeler, and Hemamala Hettige. "Economic Development, Environmental Regulation and the International Migration of Toxic Industrial Pollution: 1960-1988." In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Lutz, Ernst. "Agricultural Trade Liberalization: Price Changes and Environmental Effects." World Bank Environment Department Working Paper 16. Washington: World Bank, 1990. Also Environmental and Resource Economics 2 (1992): 79-89.
- Lutz, Ernst and Michael D. Young. "Agricultural Policies in Industrial Countries and their Environmental Impacts: Applicability to and Comparisons with Developing Nations." Environment Department Working Paper 25. Washington: World Bank, 1990.
- MacNeill, Jim. "The Shadow Ecology of National Economics: Marrying Trade and Sustainable Development," Ecodecision 3( 1993).
- Maddison, Angus and Associates. The Political Economy of Poverty, Equity, and Growth: Brazil and Mexico. New York: Oxford University Press for the World Bank, 1992.
- Mahar, Dennis. Government Policies and Deforestation in Brazil's Amazon Region. Washington: World Bank, 1989.
- Mallon, Florencia. "Economic Liberalism: Where We Are and Where We Need to Go." In Joseph Love and Nils Jacobsen, eds., Guiding the Invisible Hand: Economic Liberalism and the State in Latin American History. New York: Praeger, 1988.

- Marichal, Carlos. A Century of Debt Crises in Latin America: From Independence to the Great Depression, 1820-1930. Princeton: Princeton University Press, 1989.
- Martine, George and Ronaldo Coutinho Garcia. Os Impactos Sociais da Modernização Agrícola. São Paulo: Editora Caetes, 1987.
- Martone, Celso L. Macroeconomic Policies, Debt Accumulation, and Adjustment in Brazil, 1965-84. World Bank Discussion Paper 8. Washington: World Bank, 1987.
- Maunder, Allen and Alberto Valdés, eds. Agriculture and Governments in an Interdependent World. Twentieth International Conference of Agricultural Economists. Brookfield, VT: Gower Publishing Co., 1990.
- McCulloch, Rachael. "Gains to Latin America from Trade Liberalization in Developed and Developing Nations." In Werner Baer and Malcolm Gillis, eds., Export Diversification and the New Protectionism: The Experiences of Latin America. Champaign: University of Illinois, Bureau of Economics and Business Research, 1981.
- Meadows, Donella H. The Limits to Growth. New York: Universe Books, 1972.
- Meier, Gerald M. "Trade Policy, Development, and the New Political Economy." In Ronald W. Jones and Anne O. Krueger, eds., The Political Economy of International Trade: Essays in Honor of Robert E. Baldwin. Cambridge: Basil Blackwell, 1990.
- Meier, Gerald M. and Dudley Seers, eds. Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Mendonça de Barros, José Roberto and Alvaro Manoel. "Insumos agrícolas: Evolução recente e perspectivas." In Antonio Salazar P. Brandão, ed., Os Principais Problemas da Agricultura Brasileira: Análise e Sugestões. Rio de Janeiro: IPEA/INPES, 1988.
- Merchant, Carolyn. Ecological Revolutions: Nature, Gender and Science in New England. Chapel Hill: University of North Carolina Press, 1989.
- Meyer, William B. and B.L. Turner II. Changes in Land Use and Land Cover: A Global Perspective. New York: Cambridge University Press, 1994.
- Michael, Michael. Theories of Commercial Policy. Oxford: Philip Allan, 1977.
- Miller, Morris. Debt and the Environment: Converging Crises. New York: United Nations Publications, 1992.
- Miranda, Evaristo Eduardo and Cristina Mattos. "Brazilian Rain Forest Colonization and Biodiversity." Agriculture, Ecosystems and Environment 40 (1992): 275-296.
- Monibot, George. "Brazil: Land Ownership and the Flight to Amazonia." In Marcus Colchester and Larry Lohmann, eds., The Struggle for Land and the Fate of the Forests. London: Zed Books, 1993.

- Moran, Emilio F., Eduardo Brondizio, Paul Mausel, and You Wen. "Integrating Amazonian Vegetation, Land-use, and Satellite Data." BioScience 44, 5 (1994): 329-338.
- Moreira, Marcilio Marques. The Brazilian Quandry. New York: Priority Press Publications, 1986.
- Morris, D. "Free Trade: The Great Destroyer." The Ecologist 20, 5 (1990): 190-195.
- Muñoz, Heraldo. "'Green' vs. Trade Debate in the Americas." Journal of Environment and Development 3 (1994): 109-122.
- Myint, Hla. "Comment" on Gunnar Myrdal, "International Inequality and Foreign Aid in Retrospect." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Nader, Ralph, ed. The Case Against Free Trade: GATT, NAFTA and the Globalization of Corporate Power. San Francisco: Earth Island Press, 1993.
- Nogueira Batista, Paulo Jr. International Financial Flows to Brazil since the Late 1960s: An Analysis of Debt Expansion and Payments Problems. World Bank Discussion Paper 7. Washington: World Bank, 1987.
- Organization for Economic Cooperation and Development (OECD). The Environmental Effects of Trade. Paris: OECD, 1994.
- Ojima, D.S., K.A. Galvin, and B.L. Turner II. "The Global Impact of Land Use Change." BioScience 44, 5 (1994): 300-304.
- Ozorio de Almeida, Anna Luiza. The Colonization of the Amazon. Austin: University of Texas Press, 1992.
- Paarlberg, Philip L. and Robert G. Chambers, eds. Macroeconomics, Agriculture, and Exchange Rates. Boulder: Westview Press, 1988.
- Paarlberg, Robert L. and Merilee Grindle. "Policy Reform and Reform Myopia: Agriculture in Developing Countries," Food Policy 16 (1991): 383-394.
- Pang, Eul-Soo. "Debt, Adjustment, and Democratic Cacophony in Brazil." In Barbara Stallings and Robert Kaufman, eds., Debt and Democracy in Latin America. Boulder: Westview Press, 1989.
- Papageorgiou, Demetris, Michael Michaely, and Armeane Choksi. Liberalizing Foreign Trade vol 4. Oxford: Basil Blackwell, 1991.
- Pastor, Manuel. "The Effects of IMF Programmes on the Third World: Debate and Evidence from Latin America." World Development 15, 2 (1987): 249-262.



- Pastor, Robert A. "NAFTA as the Center of an Integration Process: The Non-Trade Issues." In N. Lustig, B. Bosworth, and R. Lawrence, ed., North American Free Trade: Assessing the Impact. Washington: Brookings Institute, 1992.
- Pastore, Alfonso-Celso. "Quantificacao dos Incentivos as Exportacoes," Estudo 1. Rio de Janeiro: Fundacao Centro de Estudos do Comercio Exterior, 1978.
- Pearce, David, Neil Adger, David Maddison, and Dominic Moran. "Debt and the Environment." Scientific American 272, 6 (1995): 52-56.
- Pearce, David W. and R. Kerry Turner. Economics of Natural Resources and the Environment. London: Harvester Wheatsheaf, 1990.
- Pearce, David W. and Jeremy J. Warford. World Without End: Economics, Environment, and Sustainable Development. New York: Oxford University Press for the World Bank, 1993.
- Pearson, Charles S. "Environment and International Economic Policy." In Seymour J. Rubin and Thomas R. Graham, eds., Environment and Trade: The Relation of International Trade and Environmental Policy. Totowa, NJ: Allanheld, Osmun and Co., 1982.
- Pearson, Charles S., ed. Multinational Corporations, Environment, and the Third World: Business Matters. Durham: Duke University Press, 1987a.
- Pearson, Charles S. "Environmental Standards, Industrial Relocation, and Pollution Havens." In Charles S. Pearson, ed., Multinational Corporations, Environment, and the Third World: Business Matters. Durham: Duke University Press, 1987b.
- Pearson, Charles S. "The Trade and Environment Nexus: What is New Since '72?" In Durwood Zaelke, Robert Housman, and Paul Orbuch, eds., Trade and the Environment: Law, Policy and Economics. Washington: Island Press, 1993.
- Peybayle, Raymond. "Rural Innovation and the Organization of Space in Southern Brazil." In David Preston, ed., Environment, Society, and Rural Change in Latin America. Chichester: John Wiley & Sons, 1980.
- Platt, D.C.M. Business Imperialism, 1840-1930: An Inquiry Based on British Experience in Latin America. Oxford: Clarendon Press, 1977.
- Porter, Michael E. The Competitive Advantage of Nations. New York: The Free Press, 1990.
- Prebisch, Raul. "Five Stages in My Thinking on Development." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Prebisch, Raul. "Economic Development and Its Principal Problems." Reprinted in John Charles Chasteen and Joseph S. Tulchin, eds., Problems in Modern Latin American History: A Reader. Wilmington, DE: Scholarly Resources Books, 1994.

- Rask, Kevin. "The Social Costs of Ethanol Production in Brazil: 1978-1987." Economic Development and Cultural Change 43, 3 (1995): 627-649.
- Raynolds, Laura T., David Myhre, Philip McMichael, Viviana Carro-Figueroa and Frederick H. Buttel. "The 'New' Internationalization of Agriculture: A Reformulation." World Development 21, 7 (1993): 1101-1121.
- Redclift, Michael. Development and the Environmental Crisis: Red or Green Alternatives. New York: Methuen, 1984.
- Reed, David, ed. Structural Adjustment and the Environment. Boulder: Westview Press for Worldwide Fund for Nature, 1992.
- Repetto, Robert. Paying the Price: Pesticide Subsidies in Developing Countries. Washington: WRI, 1985.
- Repetto, Robert and Malcolm Gillis, eds. Public Policies and the Misuse of Forest Resources. Cambridge: Cambridge University Press, 1988.
- Repetto, Robert, ed. Wasting Assets: Natural Resources in the National Income Accounts. Washington: WRI, 1989.
- Rezende, Gervásio Castro. "Agricultura e ajuste externo no Brasil: Novas consideracoes." Pesquisa e Planejamento Econômico 19, 3 (1989): 553-578.
- Rezende, Gervásio Castro. "External Adjustment and Agriculture in Brazil." In Michael J. Twomey and Ann Helwege, eds., Modernization and Stagnation: Latin American Agriculture into the 1990s. Westport: Greenwood Press, 1991.
- Richards, John F. "Land Transformation." In B.L. Turner II, W.C. Clark, R.W. Kates, J.F. Richards, J.T. Mathews, and W.B. Meyer, eds., The Earth as Transformed by Human Action. Cambridge: Cambridge University Press, 1990.
- Richards, John F. and Richard Tucker, eds. World Deforestation in the Twentieth Century. Durham: Duke University Press, 1988.
- Ritchie, Mark. "Agricultural Trade Liberalization: Implications for Sustainable Agriculture." In Ralph Nader, ed., The Case Against Free Trade: GATT, NAFTA, and the Globalization of Corporate Power. San Francisco: Earth Island Press, 1993.
- Romeiro, Ademar Ribeiro. "Alternative Developments in Brazil." In Bernhard Glasser, ed., The Green Revolution Revisited. London: Allen and Unwin, 1987.
- Røpke, Inge. "Trade, Development and Sustainability: A Critical Assessment of the 'Free Trade Dogma'." Ecological Economics 9 (1994): 13-22.

- Rubin, Seymour J. and Thomas R. Graham, eds. Environment and Trade: The Relation of International Trade and Environmental Policy. Totowa, NJ: Allanheld, Osum and Co., 1982.
- Runge, C. Ford. "Environmental Regulation and Agricultural Trade Competitiveness." In John B. Braden and Stephen B. Lovejoy, eds., Agriculture and Water Quality: International Perspectives. Boulder: Lynne Rienner Publishers, 1990.
- Runge, C. Ford. "Environmental Effects of Trade in the Agricultural Sector." Prepared for the OECD. University of Minnesota, 1991.
- Runge, C. Ford. Freer Trade, Protected Environment. New York: Council on Foreign Relations Press, 1993a.
- Runge, C. Ford. "Agricultural Trade Liberalization and Environmental Quality: A North/South Perspective." Winrock International Institute for Agricultural Development, Development Studies Paper Series, 1993b.
- Runge, C. Ford. "The Environmental Effects of Trade in the Agricultural Sector." In OECD, The Environmental Effects of Trade. Paris: OECD, 1994.
- Ruttan, Vernon, ed. Agriculture, Environment and Health: Towards Sustainable Development into the 21st Century. Minneapolis: University of Minnesota Press, 1994.
- Sabloff, Jeremy A. "Drought and Decline." Nature 375, 6530 (1995): 357.
- Sachs, Jeffrey and Andrew Warner. "Natural Resource Abundance and Economic Growth." Cambridge: Harvard Institute for International Development, 1995.
- Sanders, John H. and Vernon Ruttan. "Biased Choice of Technology in Brazilian Agriculture." In Hans Binswanger and Vernon Ruttan, eds., Induced Innovation: Technology, Institutions, and Development. Baltimore: Johns Hopkins University Press, 1978.
- Sanderson, Steven. "The Emergence of the 'World Steer': International and Foreign Domination in Latin American Cattle Production." In F. LaMond Tullis and W. Ladd Hollist, eds., Food, the State and International Political Economy: Dilemmas of Developing Countries. Lincoln: University of Nebraska Press, 1986.
- Sanderson, Steven E. The Politics of Trade in Latin American Development. Stanford: Stanford University Press, 1992.
- Sayad, J. "Planajamento, crédito e distribuição de riqueza." Estudos Econômicos 7, 1 (1977): 9-34.
- Scazzocchio, F. Barbira, ed. Land, People and Planning in Contemporary Amazonia. Cambridge: Cambridge University Press, 1980.
- Schemo, Diana Jean. "Amazon is Burning Again, as Furiously as Ever." New York Times October 12, 1995.

- Schneider, Robert. Brazil: An Analysis of Environmental Problems in the Amazon. Report 9104-BR. Washington: World Bank, 1992.
- Schiff, Maurice W. and Alberto Valdés. The Plundering of Agriculture in Developing Countries. Washington: World Bank, 1992.
- Schuh, G. Edward. The Agricultural Development of Brazil. New York: Praeger, 1970.
- Schuh, G. Edward. "The Exchange Rate and US Agriculture." American Journal of Agricultural Economics 56 (1974): 1-13.
- Schuh, G. Edward. "Some Issues Associated with Exchange Rate Realignment in Developing Countries." In Philip L. Paarlberg, and Robert G. Chambers, eds., Macroeconomics, Agriculture, and Exchange Rates. Boulder: Westview Press, 1988.
- Segerson, Kathleen. "Natural Resource Concepts in Trade Analysis." In John Sutton, ed., Agricultural Trade and Natural Resources: Discovering the Critical Linkages. Boulder: Lynne Rienner Publishers, 1988.
- Shane, Mathew and David Stallings. "Financial Constraints to Trade and Growth: Crisis and Aftermath." In Philip L. Paarlberg, and Robert G. Chambers, eds., Macroeconomics, Agriculture, and Exchange Rates. Boulder: Westview Press, 1988.
- Sheahan, John. Patterns of Development in Latin America: Poverty, Repression and Economic Strategy. Princeton: Princeton University Press, 1987.
- Shukla, J., C. Nobre and P. Sellers. "Amazon Deforestation and Climate Change." Science 247, 4948 (1990): 1322-1325.
- Siebert, Horst and Ariane Antal. The Political Economy of Environmental Protection. Greenwich, Conn.: JAI Press, 1979.
- Siebert, Horst, Ingo Walter and Klaus Zimmermann, eds. Regional Environmental Policy: The Economic Issues. New York: New York University Press, 1979.
- Siebert, Horst, et. al. Trade and Environment: A Theoretical Enquiry. New York: Elsevier Scientific Publishing, 1980.
- Singer Hans W. "Distribution of Gains between Investing and Borrowing Countries." American Economic Review 40 (1950): 473-485.
- Singer, Hans W. "The Terms of Trade Controversy and the Evolution of Soft Financing: Early Years in the U.N." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Skidmore, Thomas E. The Politics of Military Rule in Brazil: 1964-1985. New York: Oxford University Press, 1988.

- Skole, D.L. and C. Tucker. "Tropical Deforestation and Habitat Fragmentation in the Amazon: Satellite Data from 1978 to 1988." Science 260, 5116 (1993): 1905-1910.
- Skole, D.L., W.H. Chomentowski, W.A. Salas and A.D. Nobre. "Physical and Human Dimensions of Deforestation in Amazonia." BioScience 44, 5 (1994): 314-322.
- Smith, Nigel. Rainforest Corridors: The Transamazon Colonization Scheme. Berkeley: University of California Press, 1982.
- Smith, William C. "Heterodox Shocks and the Political Economy of Democratic Transition in Argentina and Brazil." In William L. Canak, ed., Lost Promises: Debt, Austerity, and Development in Latin America. Boulder: Westview Press, 1989.
- Sorsa, Piritta. "GATT and Environment: Basic Issues and Some Developing Country Concerns." In Patrick Low, ed., International Trade and the Environment. World Bank Discussion Paper 159. Washington: World Bank, 1992.
- Southgate, Douglas. The Economics of Land Degradation in the Third World. World Bank Environment Department Working Paper 2. Washington: World Bank, 1988.
- Southgate, Douglas. Economic Progress and the Environment: One Developing Country's Policy Crisis. New York: Oxford University, 1994.
- Spraos, J. "The Statistical Debate on the Net Barter Terms of Trade between Primary Commodities and Manufactures." Economic Journal 90, 357 (1980): 107-128.
- Stallings, Barbara. Banker to the Third World: U.S. Portfolio Investment in Latin America, 1900-1986. Berkeley: University of California Press, 1987.
- Stein, Stanley and Barbara Stein. The Colonial Heritage of Latin America: Essays on Economic Dependence in Perspective. New York: Oxford University Press, 1970.
- Streeten, Paul. "Trade as the Engine, Handmaiden, Brake or Offspring of Growth?" The World Economy 5, 4 (1982): 415-17.
- Streeten, Paul. "Development Dichotomies." In Gerald M. Meier and Dudley Seers, eds., Pioneers in Development. New York: Oxford University Press for the World Bank, 1984.
- Stepan, Alfred, ed. Democratizing Brazil: Problems of Transition and Consolidation. New York: Oxford University Press, 1989.
- Sunkel, Osvaldo. "The Interaction Between Styles of Development and the Environment in Latin America." CEPAL Review 12 (1980): 15-49.
- Sunkel, Osvaldo ed. Development from Within: Toward a Neostructuralist Approach for Latin America. Boulder: Lynne Rienner, 1993.

- Super, John C. Food, Conquest, and Colonization in Sixteenth-Century Spanish America. Albuquerque: University of New Mexico Press, 1988.
- Super, John C. and Thomas C. Wright, eds. Food, Politics, and Society in Latin America. Lincoln: University of Nebraska, 1985.
- Sutton, John D., ed. Agricultural Trade and Natural Resources: Discovering the Critical Linkages. Boulder: Lynne Rienner Publishers, 1988.
- Sutton, John D. and Alan Webb. "Trade Policies and the Use and Value of Natural Resources." In John Sutton, ed., Agricultural Trade and Natural Resources: Discovering the Critical Linkages. Boulder: Lynne Rienner Publishers, 1988.
- Taylor, Lance. Structuralist Macroeconomics: Applicable Models for the Third World. New York: Basic Books, 1983.
- Taylor, Lance, Edmar L. Bacha, Eliana A. Cardoso, and Frank J. Lysy. Models of Growth and Distribution for Brazil. New York: Oxford University Press for the World Bank, 1980.
- Teital, Simon and Francisco Thoumi. "From Import Substitution to Exports: The Manufacturing Exports Experience of Argentina and Brazil." Economic Development and Cultural Change 34, 3 (1986): 455-490.
- Teubal, Miguel. "Internationalization of Capital and Agroindustrial Complexes: Their Impact on Latin American Agriculture." Latin American Perspectives 54, 14 (1987): 316-364.
- Thompson, Robert L. "U.S. Macroeconomic Policy and Agriculture." In Philip L. Paarlberg, and Robert G. Chambers, eds., Macroeconomics, Agriculture, and Exchange Rates. Boulder: Westview Press, 1988.
- Thorp, Rosemary, ed. Latin American Debt in the 1930s: The Role of the Periphery in World Crisis. Cambridge: Cambridge University Press, 1984.
- Thorp, Rosemary. "A Reappraisal of the Origins of Import-Substituting Industrialization: 1930-50." Journal of Latin American Studies 24 (Supplement 1992): 181-195.
- Topik, Steven. The Political Economy of the Brazilian State, 1889-1930. Austin: University of Texas, 1987.
- Tucker, Richard P. and John F. Richards, eds. Global Deforestation and the Nineteenth Century World Economy. Durham: Duke University Press, 1983.
- Turner, B.L. II, David Skole, Steven Sanderson, Gunter Fischer, Louise Fresco and Rik Leemans. Global Land-Use and Land-Cover Change. IGBP Report 35, HDP Report 7: Science/Research Plan for the Joint International Geosphere-Biosphere Programme and the Human Dimensions of Global Environmental Change Programme. Stockholm: IGBP/HDP, 1995.

- Twomey, Michael J. and Ann Helwege, eds. Modernization and Stagnation: Latin American Agriculture in the 1990s. New York: Greenwood Press, 1991.
- Tyers, R. and Kym Anderson. "Liberalizing OECD Agricultural Policies in the Uruguay Round: Effects on Trade and Welfare." Journal of Agricultural Economics 39 (1988): 197-216.
- Tyler, William G. "Effective Incentives for Domestic Market Sales and Exports: A View of Anti-Export Bias and Commercial Policy in Brazil, 1980-81." Journal of Development Economics 18, 2-3 (1985): 219-42.
- Uhl, C., R.B. Buschbacher, and E.A.S. Serrão. "Abandoned Pastures in Eastern Amazonia: I. Patterns of Plant Succession." Journal of Ecology 76 (1988): 663-681.
- United Nations (UN). Economic Survey of Latin America, 1949. New York: Secretariate of Economic Commission for Latin America, 1951.
- United Nations Development Programme (UNDP). Human Development Report. New York: UNDP, 1992.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Sustainable Development: Changing Production Patterns, Social Equity and the Environment. Santiago: UN, 1991.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Economic Survey of Latin America and the Caribbean. Santiago: UN, various years.
- United Nations Economic Commission for Latin America and the Caribbean (ECLAC). Statistical Yearbook for Latin America and the Caribbean. Santiago: UN, various years.
- Valadares, Tadeu. "Deforestation: A Brazilian Perspective." In Joseph S. Tulchin, ed. Economic Development and Environmental Protection in Latin America. Boulder: Lynne Rienner publishers, 1991.
- Velloso, João Paulo dos Reis, ed. A Ecologia e o Novo Padrão de Desenvolvimento no Brasil. São Paulo: Nobel, 1991.
- Von Doellinger, Carlos. "Foreign Trade Policy and Its Effects." Brazilian Economic Studies 1 (1975): 39-96.
- Walter, Ingo. International Economics of Pollution. New York: John Wiley and Sons, 1975.
- Walter, Ingo. "International Economic Repercussions of Environmental Policy: An Economist's Perspective." In Seymour J. Rubin and Thomas R. Graham, eds., Environment and Trade: The Relation of International Trade and Environmental Policy. Totowa, NJ: Allanheld, Osum and Co., 1982.
- Whiteford, Scott and Anne E. Ferguson, eds. Harvest of Want: Hunger and Food Security in Central America and Mexico. Boulder: Westview Press, 1991.

- Williams, M. "Forest and Tree Cover." In W.B. Meyer and B.L. Turner II, eds., Changes in Land Use and Land Cover: A Global Perspective, Cambridge: Cambridge University Press, 1994.
- Williams, Robert. Export Agriculture and the Crisis in Central America, Chapel Hill: University of North Carolina Press, 1986.
- Williamson, John. Latin American Adjustment: How Much Has Happened? Washington: Institute for International Economics, 1990.
- Wood, Charles and José Alberto Magno de Carvalho. The Demography of Inequality in Brazil, New York: Cambridge University Press, 1988.
- Wood, Charles and Marianne Schmink, eds. Frontier Expansion in Amazonia, Gainesville: University of Florida Press, 1984.
- World Bank. World Development Report, New York: Oxford University Press, various years.
- World Bank. Alcohol Production from Biomass in the Developing Countries, Washington: World Bank, 1980.
- World Bank. Brazil: A Review of Agricultural Policies, Washington: World Bank, 1982.
- World Bank. Brazil Agricultural Sector Review: Policies and Prospects, Report 7798-BR, Washington: World Bank, 1990.
- World Bank. World Development Report: Development and the Environment, New York: Oxford University Press, 1992.
- World Bank. Brazil: The Management of Agriculture, Rural Development and Natural Resources, Report 11783-BR, Washington: World Bank, 1994.
- World Commission on Environment and Development (Brundtland Commission). Our Common Future, Oxford: Oxford University Press, 1987.
- World Resources Institute. World Resources, New York: Oxford Press, various years.
- Young, Michael D. "International Trading Arrangements, the Intensity of Resource Use, and Environmental Quality." In John B. Braden and Stephen B. Lovejoy, eds., Agriculture and Water Quality: International Perspectives, Boulder: Lynne Rienner Publishers, 1990.
- Young, Michael D. "Ecologically-Accelerated Trade Liberalisation: A Set of Disciplines for Environment and Trade Agreements." Ecological Economics 9 (1994): 43-51.
- Yu, Douglas. "Free Trade is Green, Protectionism is Not." Conservation Biology 8, 4 (1994): 989-996.
- Zaelke, Durwood, Robert Housman and Paul Orbach, eds. Trade and the Environment: Law, Policy and Economics, Washington: Island Press, 1993.



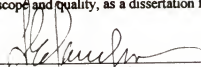
Zietz, Joachim and Alberto Valdés. The Costs of Protectionism to Developing Countries: An Analysis for Selected Agricultural Products. Washington: World Bank, 1986.

## BIOGRAPHICAL SKETCH

Pamela Stedman received a Bachelor of Arts degree, *magna cum laude*, in English and French from Dickinson College in Carlisle, Pennsylvania, in 1985. She received a Master of Arts, with honors, in International Studies with concentrations in International Economics and Western European Studies, from the School of Advanced International Studies (SAIS) of The Johns Hopkins University in Bologna, Italy and Washington, DC in 1988. She was awarded an internship by the SAIS Center for Brazilian Studies and spent three months with Coca Cola Industrias of Rio de Janeiro in 1988. In her degree work at the University of Florida she has concentrated in comparative politics and in public policy and administration, with a focus on Latin American political economy and environmental policy.

Ms. Stedman worked as a consultant for the World Bank between 1989 and 1992, and in 1994, and for the Worldwide Fund for Nature (WWF) in 1995. At the World Bank, she worked primarily on preparation and monitoring of environmental projects in Brazil, including mining clean-up, pollution control, and reforestation projects. She has published a paper for WWF on proposed reforms to improve the environmental performance of the World Bank and IMF.

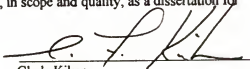
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Steven Sanderson, Chairman  
Professor of Political Science

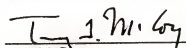
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Goran Hyden  
Professor of Political Science


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Clyde Kiker  
Professor of Food and Resource  
Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

  
Terry McCoy  
Professor of Political Science

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

  
Walter Rosenbaum  
Professor of Political Science

This dissertation was submitted to the Graduate Faculty of the Department of Political Science in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Dean, Graduate School